JANUARY 4, 1945

American Machinist

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Tool Control System Curbs Waste in War Production

•

Tray Improvements in Pusher Furnaces

•

Well Designed Fixtures Speed Machining of Gun Mounts

•

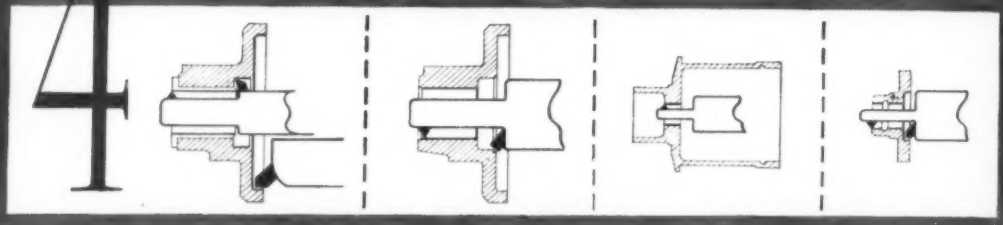
Milling Cutters and How to Use Them

Reconversion Section

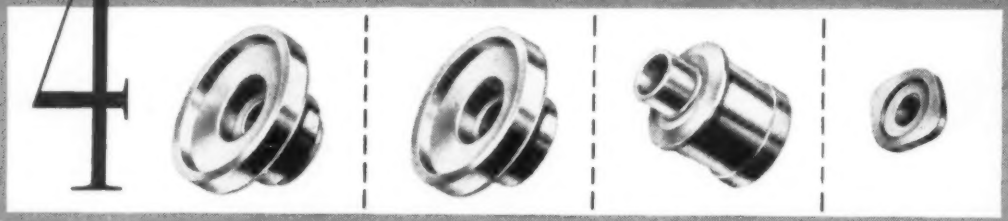
SURPLUS DISPOSAL · PLANT SALES · SPOT AUTHORIZATION

R v.89 Jan.-Feb. 1945

4 OPERATIONS



ON 4 PARTS SIMULTANEOUSLY!



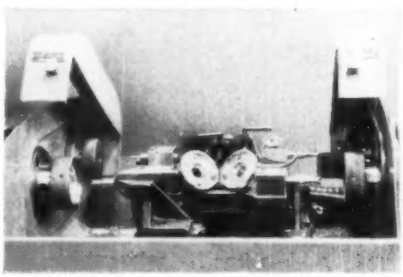
A Single HEALD BORE-MATIC *Does It!*

What can *borizing* on Bore-Matics do for you? In short, it will enable you to hold closer tolerances, obtain a better finish and step up production rates. And these results can be obtained on *all* types of operations — on *all* types of work.

The basic adaptability of Heald Bore-Matic design makes it possible, for example, to do boring, turning, facing, chamfering, grooving and fly-cutting. Straight and taper surfaces can be machined as well as curves and irregular shapes. All these operations can be performed singly, simultaneously, progressively, or in combination. In addition to final finishing — where the surface obtained often reduces or even eliminates lapping and honing — Bore-Matics are applicable for roughing and semi-finishing.

To help in planning faster, lower-cost production, better post-war products ... get the Bore-Matic story *today*.

THE HEALD MACHINE CO.
WORCESTER 6, MASS.



This Heald Bore-Matic is arranged to precision finish four different parts in the same cycle. Adapter Assembly, Housing, Adapter and Coupling are held in rotating fixtures and several finishing operations performed on each piece—including facing, boring, counterboring and chamfering.

HEALD *Bore-Matics*

THE MOST VERSATILE MACHINE TOOL

Internal and Surface Grinding Machines • Bore-Matic Precision Finishing Machines

American Machinist

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★ To _____

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American Machinist Chips

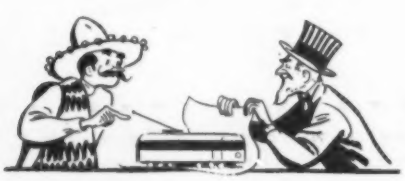
Big Annual Issue . . . The next issue of *American Machinist* will bring to you a regular Metal-Working institution . . . the 32nd Annual Review Number.

Veteran subscribers know well the purpose and scope of this year 'round reference book. New readers should know that it is an illustrated summary of more than 1,000 items of new equipment, materials and parts introduced to Metal-Working through *American Machinist* during the past year. Consequently, it is a valuable source of up-to-the-minute ideas and buying data to help you locate quickly and easily the equipment and materials needed in your plant.

We think you will want to watch for this issue and to keep it handy for months to come.

Plants for Sale . . . Jesse H. Jones, Secretary of Commerce, has announced that the R.F.C. is distributing a "Briefalog" containing an advance list of plants and sites built and owned by its subsidiary D.P.C. The list of plants is being circulated now to give industry advance information as to the size, character, and location of its plants so that when any are declared surplus and no longer necessary to the war effort they can be converted to civilian production through lease or sale with all possible speed and least possible loss of employment.

The "Briefalog" will be available at all R.F.C. agencies, Chambers of Commerce and may be referred to at any bank or railroad.



Foreign Trade . . . The Office of the Coordinator of Inter-American Affairs have made a study indicating that Latin America will need machinery and equipment totaling $9,800,000,000 over the 10-year period after the war.

Of this total, $7,000,000,000 is expected to be spent for new equipment and $2,800,000,000 for used equipment. Brazil's requirements head the list with $3,659,000,000, Mexico's estimated at $1,777,000,000, Argentina's at $1,167,000,000 and so on down the line.

The biggest item by type of requirement is in the field of transportation, with manufacturing equipment and power and communication following in that order.

Radiography . . . One of the noteworthy trends in metal-working has been the growth of industrial X-ray as a production inspection method. A number of different types of equipment are available—ranging from large units for inspecting heavy-duty work such as boiler welds and pressure vessels to compact production-line units for continuous X-ray of small parts. Most units are electrical; some use radium to cause a shadowgraph to appear on the film.

We believe many plants with inspection problems can profitably investigate the use of industrial X-ray.

Lend-Lease . . . The Foreign Economic Administration said recently that the following proportions of our munitions production have been Lend-Leased: Aircraft 16%; guns 12.6%; ammunition 16.2%; tanks and other vehicles 24.8%; ships, 9.9%. These figures are based on dollar value.

Training Courses . . . Caterpillar Tractor outlined in its recent *Labor-Management Production Drive Bulletin* some of the courses being offered by the company's training department.

High spotted are educational series on "Fourteen-Months' Production Welding," "Four-Year Machinist Apprenticeship," "Sixteen-Months' Production Machinist Training Course" and "Four-Year Patternmaker Apprenticeship."

Also available are several "streamlined" special courses designed to upgrade employees and increase their skill to aid the war effort.

Spot Air-Conditioning . . . Carrier Corporation has developed a revolutionary new principle for air-conditioning systems. It permits individual-room control in multi-room buildings such as hotels, hospitals and apartment houses. The new system—called conduit weathermaster air-conditioning — eliminates entirely the re-use of air, making it unnecessary to carry conditioned air from one room to another. Conditioned air is infused directly into each room at desired temperatures and then drawn off and discharged into the outdoor atmosphere.

Martin Marathon . . . It was something of a surprise to us to learn from the *Martin Star* that the famous China Clipper has been winging its long-hop way over the seas for 10 years. Now in service flying to South America, the China Clipper is a model of solid ruggedness upon which not only aviation but the automotive world of cars, buses and trucks might look with respect.

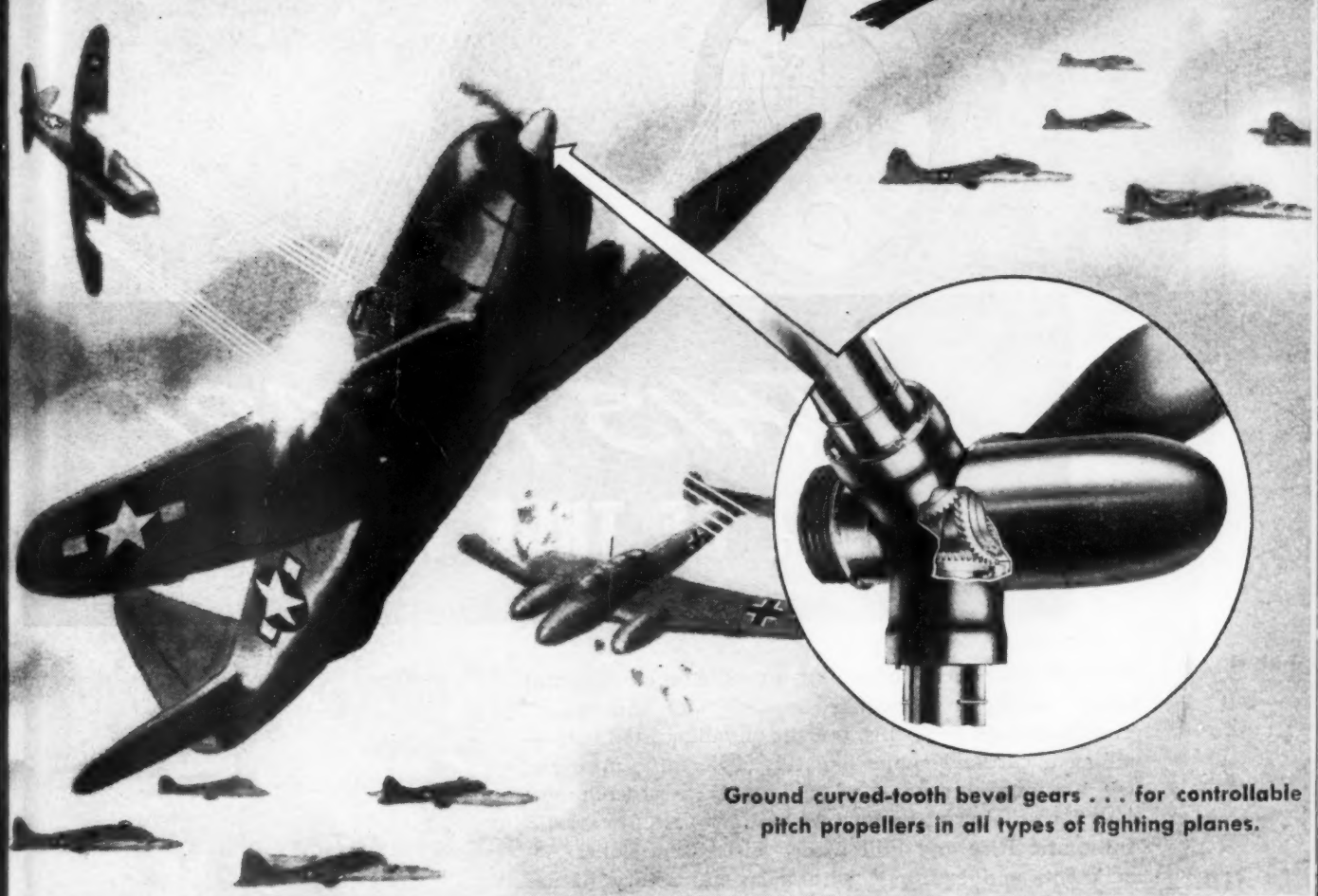
From the Mailbag . . . Here is another comment from a reader on the value of the advertising pages in *American Machinist:*

"Recently we renewed our subscription to the American Machinist, *as we have read with interest the many articles that help keep us well advised on new methods and improvements as required in our manufacture.*

"We find the advertisements helpful in locating suppliers of new equipment, as well as suppliers who will enable us to keep machinery we have had in use for some time in good condition.

"It is our sincere belief that the American Machinist *lends much in latest developments to any industrial organization." Wm. G. Horne, Pres., Industrial Luggage Incorporated, Pittsburgh, Pa.*

BEVEL GEAR DRIVES — TO *Victory*



Ground curved-tooth bevel gears . . . for controllable pitch propellers in all types of fighting planes.

EXTRA POWER FOR EVERY EMERGENCY

By varying automatically in flight the angular direction or pitch of the propeller blades, controllable pitch propellers make possible the most efficient aircraft engine operation under all conditions . . . take-offs, speedy climbs, sharp banks, swift power dives or high altitude dog fights.

GROUND CURVED-TOOTH BEVEL GEARS PROVIDE INSTANTANEOUS, PRECISE FEATHERING OF ALL BLADES

Bevel gears are naturally used as the means of pitch control. A central bevel gear engages bevel pinion segments on the inner end of each blade shaft. Any slight rotation of this central gear in response to variations in power requirements instantly changes the pitch of each blade in the same amount.

The conical form of bevels allows assembling without backlash by the individual axial adjustment of each pinion. This decreases the likelihood of vibration and insures instantaneous changes of pitch as required.

Curved-tooth bevel gears possess localized tooth contact which compensates for minor deflections of the gears in operation. The hardened and ground tooth surfaces of these gears provide in a light-weight compact unit the strength to carry the torque and the accuracy to maintain uniform pitch of all blades.

CUT AND GROUND ON GLEASON MACHINES

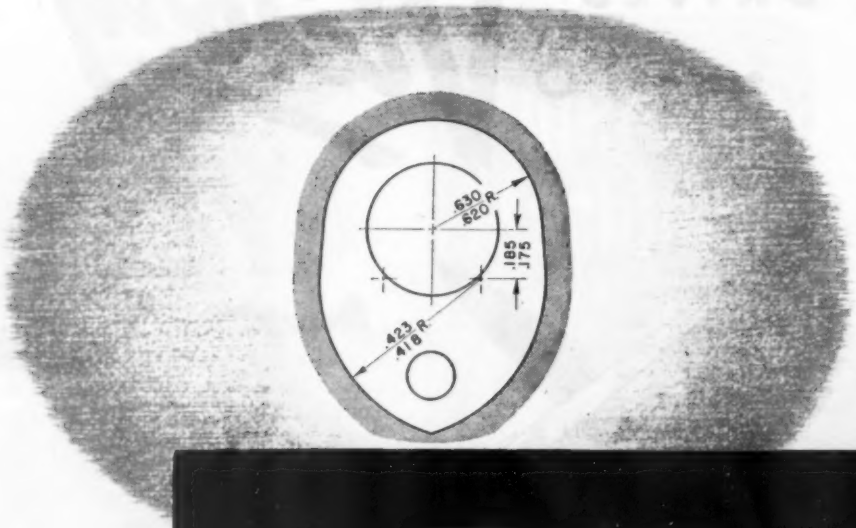
These precision gears are cut on the No. 16 Machines and ground on the No. 17 Hypoid Grinder at high production rates.

This is just one illustration of the many uses of bevel gears in aircraft, which offer a promise of continually improved operation for the airplanes of the future.

GLEASON WORKS

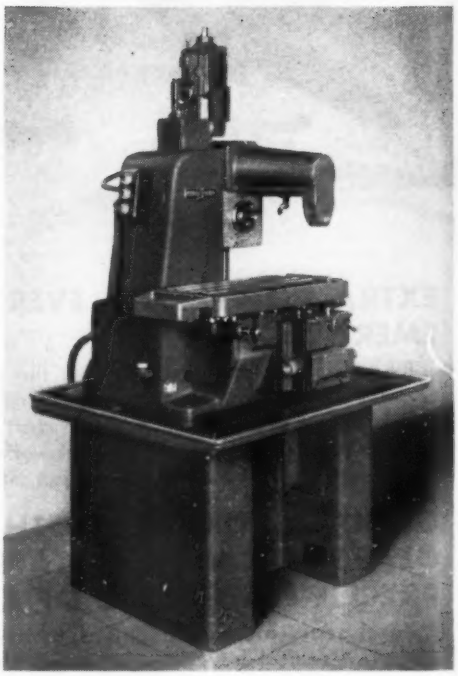
Builders of Bevel Gear Machinery for Over Seventy-five Years

1000 UNIVERSITY AVENUE, ROCHESTER 3, N. Y., U. S. A.



THIS HEART MUST BE TRUE WITHIN .005"

The ordinary concept of milling a profile on a horizontal miller, usually a shape like this ⌒ or this ⌣ presents enough problems, but the one illustrated here — milling a cardioid shape like this ♡, *really rings the bell* in unusual profiles. The part is a supercharger shaft for an aircraft motor. A standard CINCINNATI 0-8 Automatic Rise and Fall Miller with Cam Roller Attachment, and equipped with a special rotary fixture driven by an independent motor, milled completely around the cardioid section. ¶ After the part is loaded into the chuck type fixture, a flip of the starting lever sets the machine in motion, and the entire operation proceeds automatically. The table rapidly traverses to milling position, where it is stopped and locked in position. After the milling cutter is rapidly lowered to milling position, the spindle carrier trips a switch which starts the rotating movement of the work piece in the fixture. This rotary motion, along with the vertical feeding movement of the spindle carrier (controlled by the cam on the fixture) creates the desired profile. Upon completion of the milling operation the table rapidly returns to starting position for unloading and reloading. ¶ This setup was developed by the Cincinnati Application Engineers who will be glad to give you the benefit of their wide experience in the adaptation of CINCINNATI Machines to difficult milling problems.

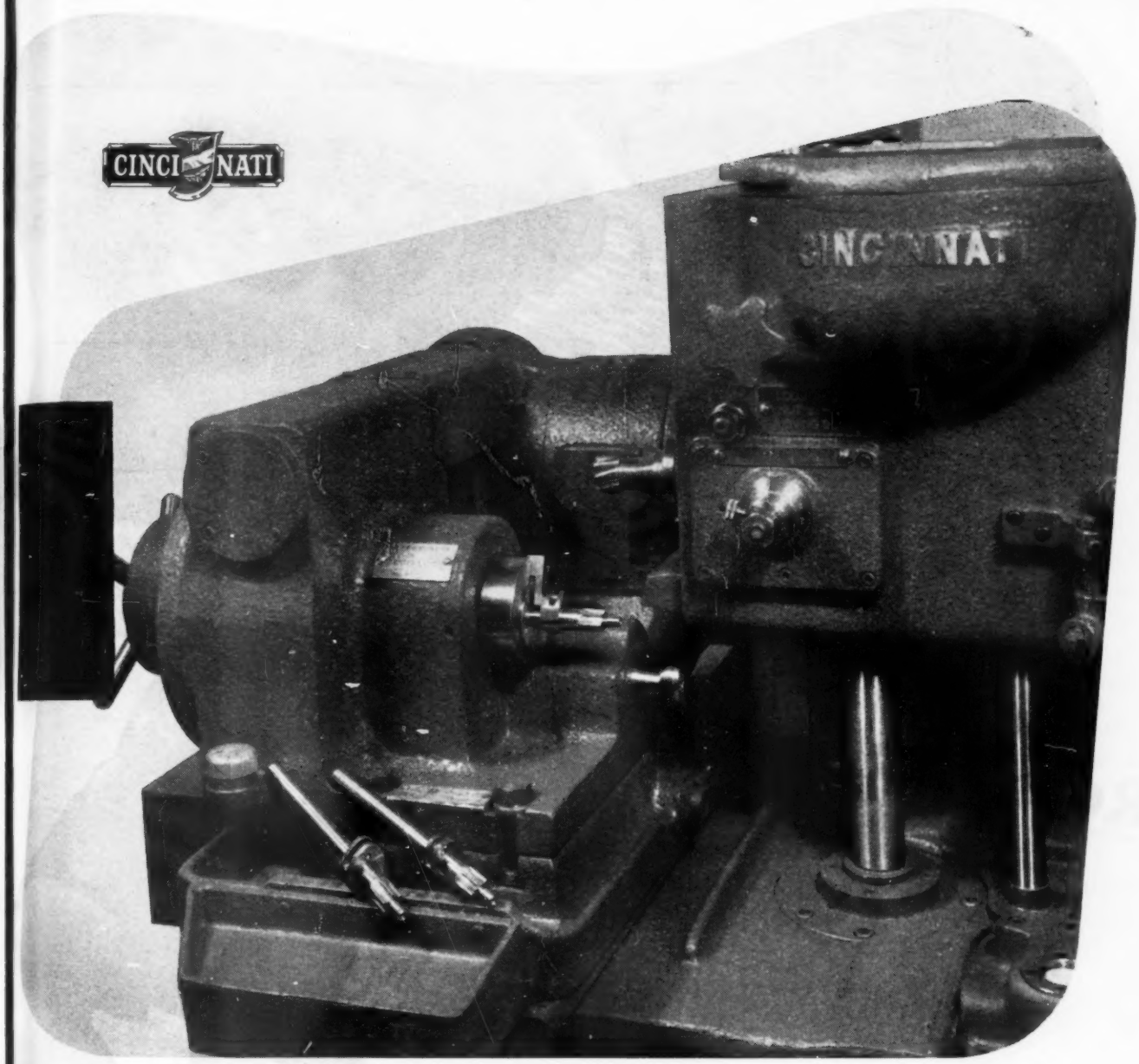


CINCINNATI 0-8 Automatic Rise and Fall Milling Machine. Catalog M-964-1 contains complete specifications. Sweet's Catalog File for Mechanical Industries gives a brief description of this machine.

Keep on buying WAR BONDS

THE CINCINNATI

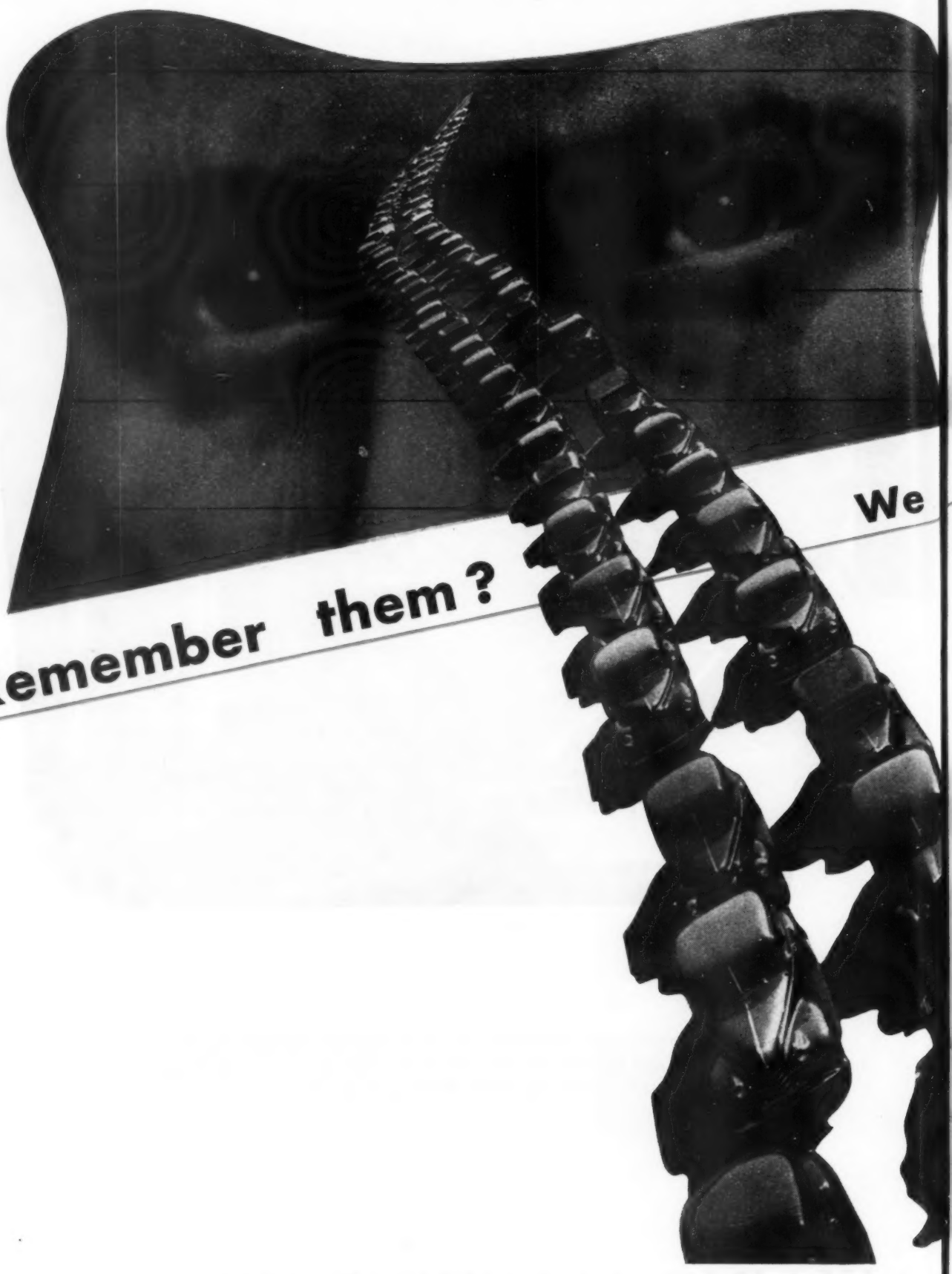
MILLING MACHINES



In this milling operation the entire sequence of machine movements, together with the electrical and mechanical functions of the fixture, were worked out for automatic operation, producing about thirty parts per hour.

MILLING MACHINE CO. CINCINNATI 9, OHIO, U. S

BROACHING MACHINES • CUTTER SHARPENING MACHINES


Remember them?
We

Helped to Build Every One of Them!

It was a familiar sight during peacetime. Nowhere else in the world could you see its equal... It was America on wheels—a nation going places in 30 million automobiles.

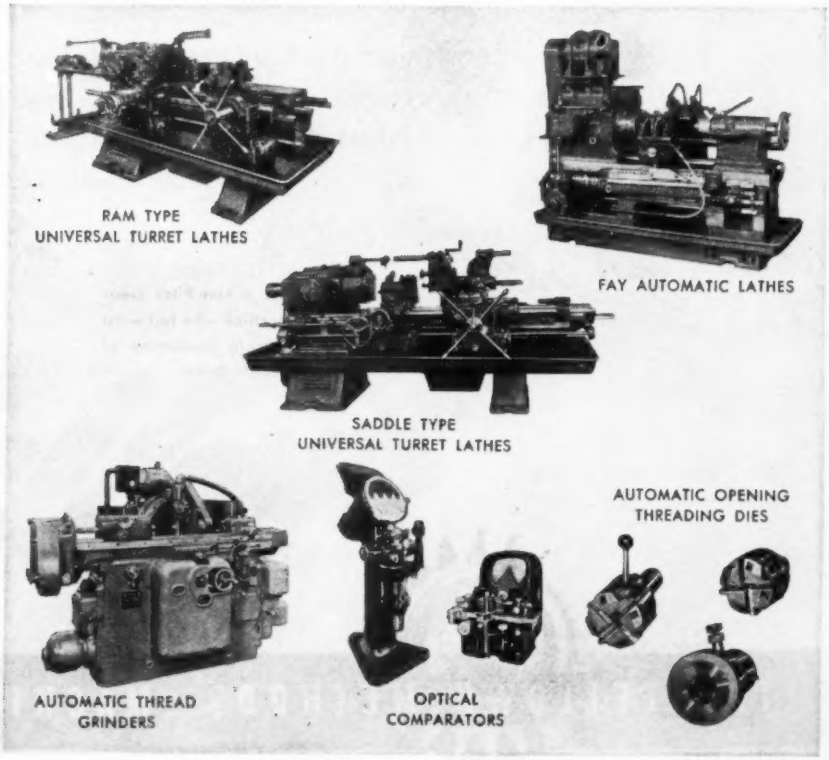
And we helped to build every one of them!

But that's not all. Look down that stream of cars all the way to the beginning...

Machine tools designed by Jones & Lamson have been used by the automotive industry ever since the first automobile. They helped to make possible the mass production of interchangeable parts which in turn has made possible millions of automobiles.

As the oldest machine tool company in America, there are no major industries and few important products to which Jones & Lamson engineering has not contributed.

We consider that record one of the most important testimonials that could be advanced in bidding for the opportunity to help your designers and engineers plan new products and production methods now.



JONES & LAMSON
MACHINE COMPANY
SPRINGFIELD, VERMONT, U. S. A.

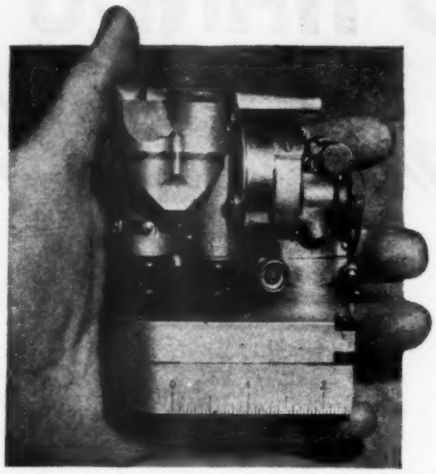
Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

THIS TRAIN OF FINE-PITCH G

Fellows No. 4 Fine-Pitch Gear Shaving Machine—the last word in the accurate production of small fine-pitch Gears.

THE FELLOWS METHOD...MACHINES AND TOOLS FOR

GEARS Controls THE ACCURACY OF THIS 1½ LB. POCKET TRANSIT



The Suverkrop "Universal" transit weighs 1.5 lbs. — 1/11 of the conventional 5 in. 1 minute transit's 16 lbs. Its bulk is .03 cu. ft.—1/18 that of the conventional transit's .55 cu. ft.

Suverkrop Instruments, Bakersville, California, had a problem—the production of a pocket-size transit which would have the accuracy of a standard surveying instrument, and weigh less than 1/10 as much. The accuracy of this pocket-size transit was dependent upon a train of small fine-pitch gears. The requirements were that this instrument had to be accurate to within two minutes of arc.

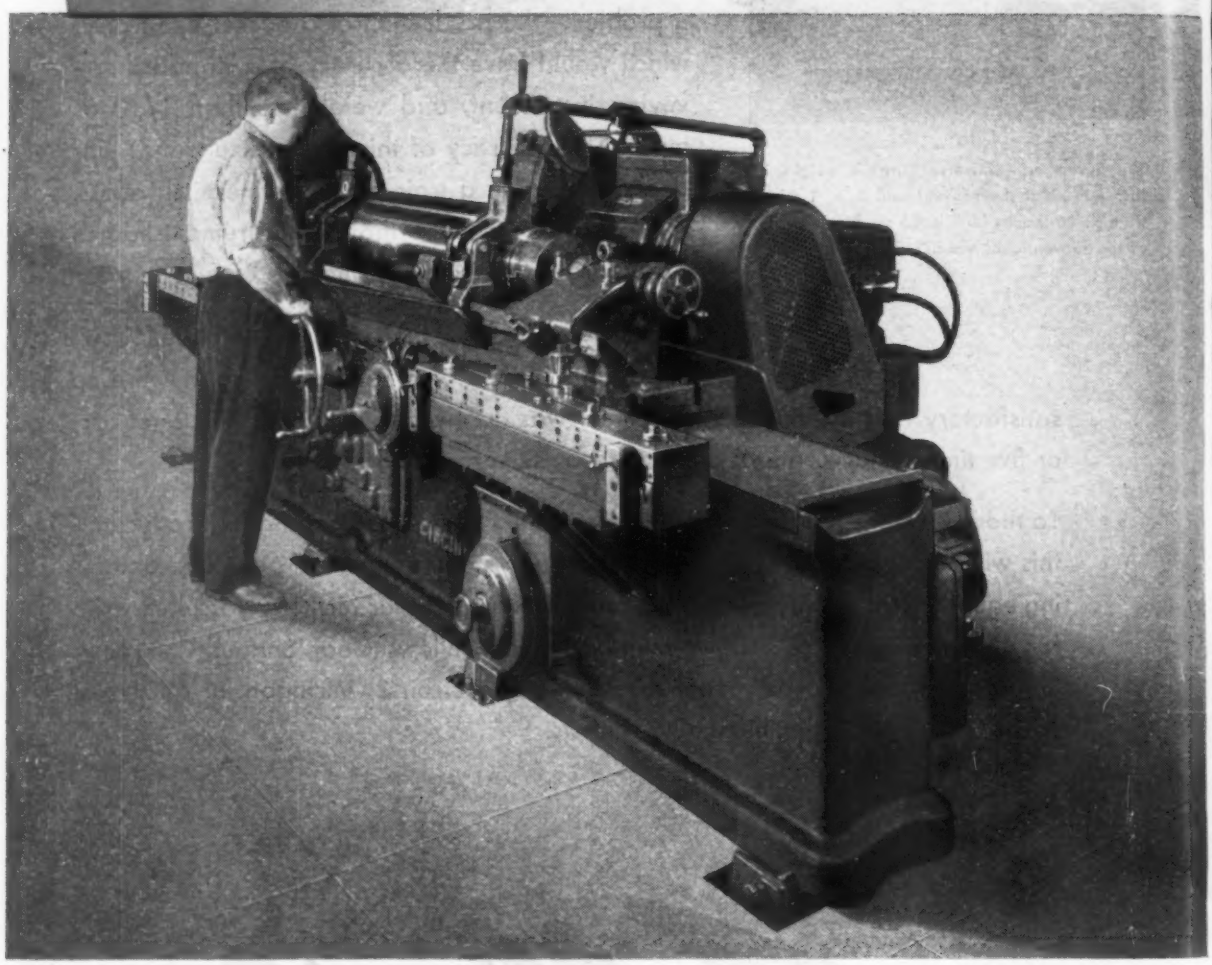
This problem was put up to Fellows, with the following results: Gears were produced which were so satisfactory that the finished instrument was accurate to within ¾ minute of arc, or five times as accurate as demanded by Suverkrop Instruments.

To those who are thoroughly familiar with the Fellows Method of gear production, this will not appear as an unusual feat. Many manufacturers of gears are obtaining equally high-quality gears from Fellows machines. For further particulars write for your copy of "The Fellows Method" — The Fellows Gear Shaper Company, Springfield, Vermont—or 616 Fisher Building, Detroit 2, Michigan, or 640 West Town Office Building, Chicago 12, Illinois.

Fellows

ALL OPERATIONS FROM BLANK TO FINISHED GEAR

THEY'RE OLD HANDS *at grinding*

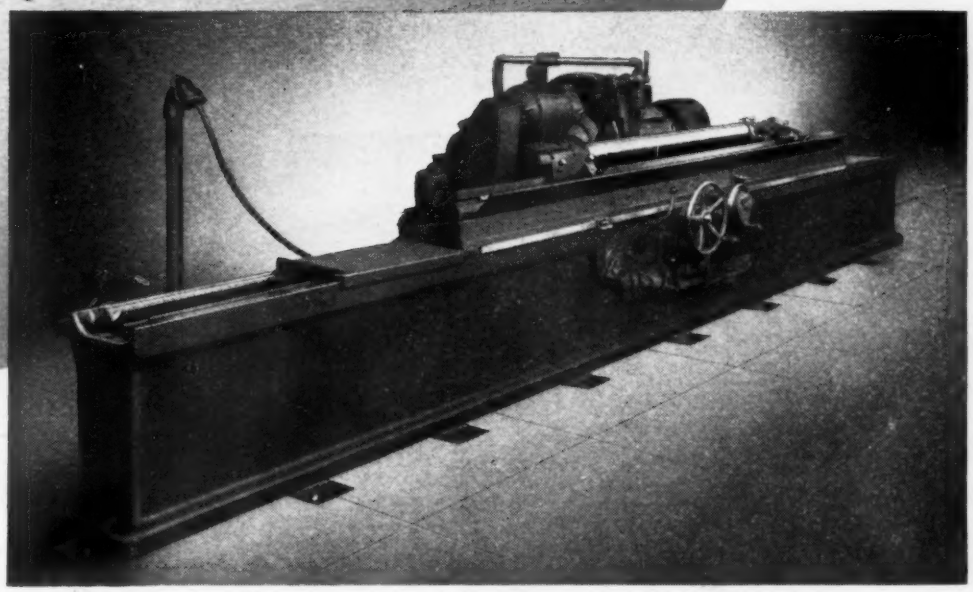


Keep on buying WAR BONDS

CINCINNATI

CENTER TYPE GRINDING MACHINES

these fussy jobs!



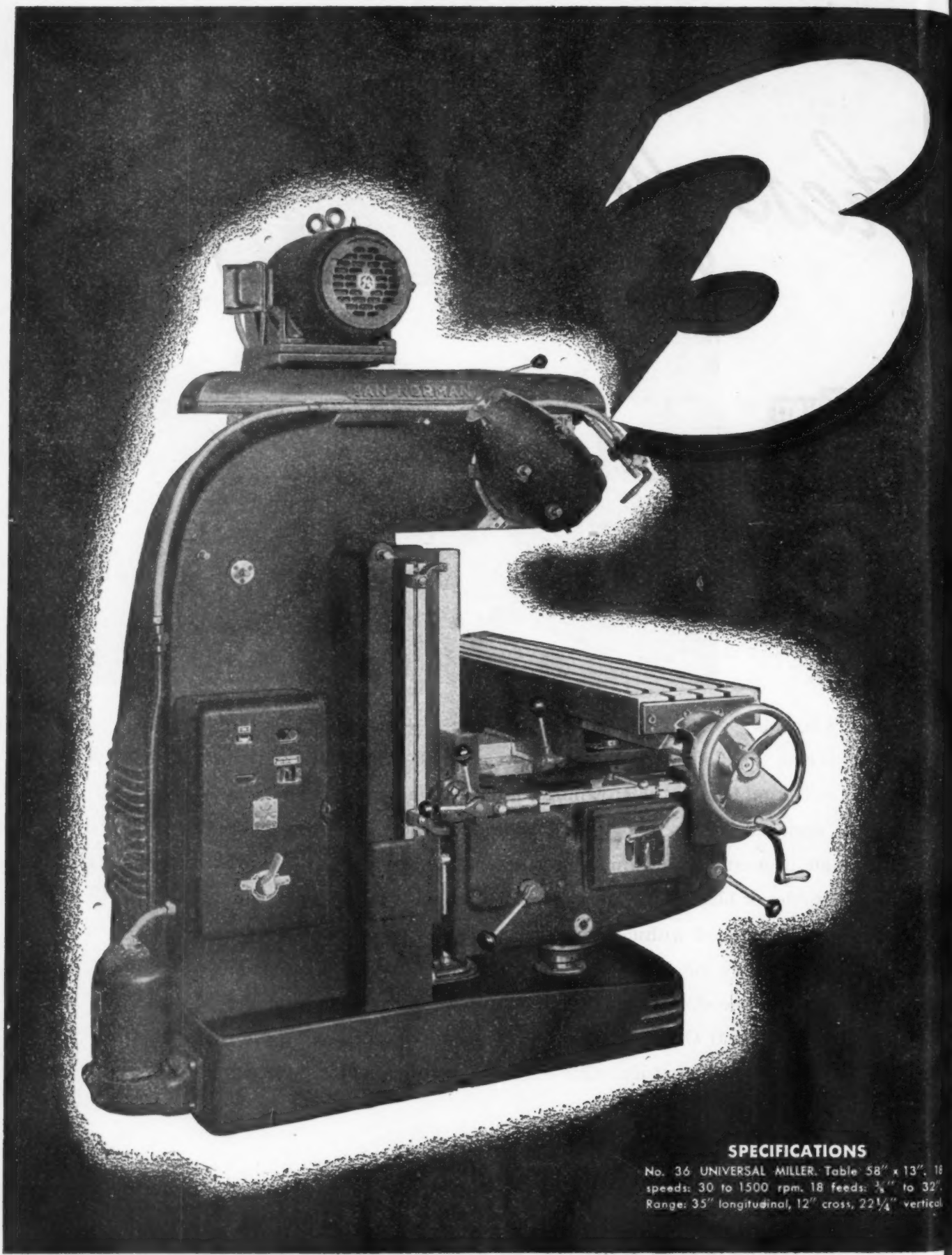
Right: CINCINNATI *14"x48" Plain Self-Contained Grinder. These machines are available in 14" and 16" swing sizes; between-center lengths up to 168". Catalog No. G-491-1 contains complete specifications.*

Here's one place where they both have to be good—the machine and the operator. In this case the machine is a CINCINNATI 16" x 72" Plain Self-Contained Grinder with swivel table type roll crowning equipment, and the operator is finish grinding a crowned roll used for rolling aluminum foil. This operation requires the ultimate in accuracy and finish because aluminum foil must be produced without wrinkles or blemishes. The ends of the roll must be the same diameter within .0001", and finished within 4 micro inches. Any rolling mill operator will tell you what a fussy job this is and that a machine capable of doing this class of work *has to be good.* ¶ Perhaps you have unusually accurate grinding operations where CINCINNATI Grinding Machines, with their exclusive Filmatic bearings, could be used to advantage. Our engineers will be glad to discuss it with you.

GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES



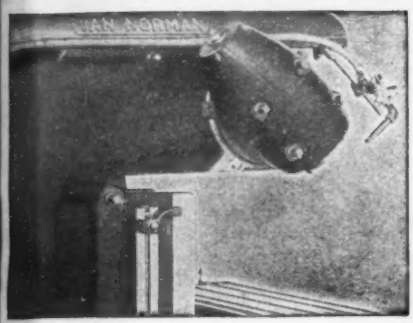
SPECIFICATIONS

No. 36 UNIVERSAL MILLER. Table 58" x 13". 18
speeds: 30 to 1500 rpm. 18 feeds: 3/8" to 32".
Range: 35" longitudinal, 12" cross, 22 1/4" vertical

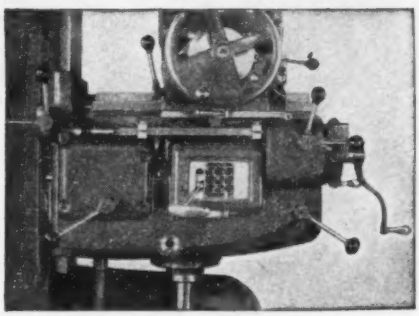
...IT PAYS TO

VAN NORMAN ADVANTAGES

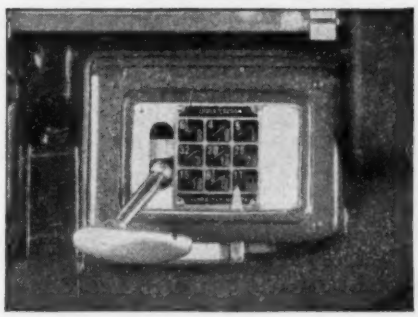
that speed up production on RAM TYPE UNIVERSAL MILLING MACHINES



1 ADJUSTABLE CUTTERHEAD



2 FRONT AND REAR DIRECTIONAL CONTROLS



3 SINGLE LEVER FEED SELECTOR

Van Norman Ram Type Universal Millers provide operators with three distinct operating advantages that increase work accuracy, minimize work reset-ups, lessen worker's fatigue and speed production.

1. The *adjustable cutterhead* gives you precision horizontal, angular or vertical milling by simply swinging the cutterhead to the desired milling position. This feature enables operators to perform most milling operations without changing the original work set-up. It saves valuable man and machine hours because there is no waiting for other types of millers to become available and changing the work from one miller to another is eliminated.

2. *Front and rear directional controls* of all power feeds, including the 6-way rapid traverse, enable the operator to operate the machine from either the front or rear of the machine thereby providing greater work visibility. These controls operate in the direction of the table, saddle or knee movement thus the operator always knows that the unit will move in the direction that the lever is positioned.

3. The *exclusive single lever feed selector* provides quick convenient selection of 18 feeds from 3/8" to 32" rpm. on No. 36 illustrated. The operator merely moves the selector lever up or down and right or left to the desired speed indicated by the coincidental pointer on the direct reading dial. A quick change speed selector, located on front of ram provides 18 speeds from 30 to 1500 rpm.

VAN NORMAN COMPANY

Springfield, Massachusetts

AN NORMANIZE

16 *Vital*

Single pulley drive and bearings · Gear disconnecting any opens and closes by inner walls · guides through felt giving fly-wheel ef-

THE LANDIS CHASER

The finest thread cutting tool in industry.

The many new and exclusive features of LANDMACO Threading machines combine to assure the greatest possible degree of accuracy, ease of operation and flexibility in making set-up changes.

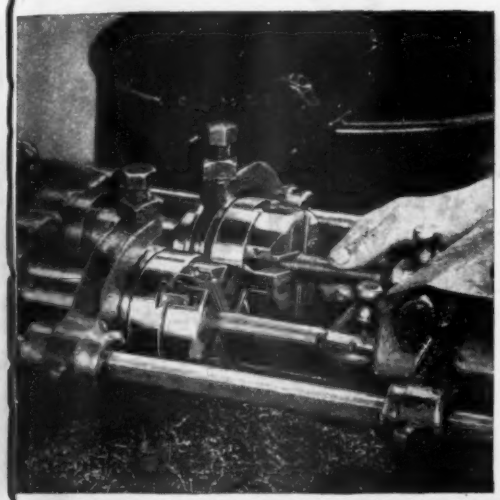
LANDIS

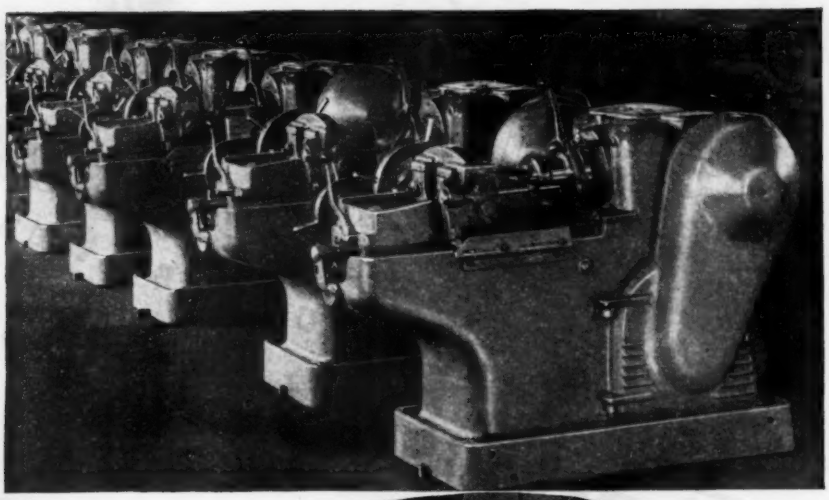
THREADING MACHINERY · THREAD CUTTING DIE HEADS

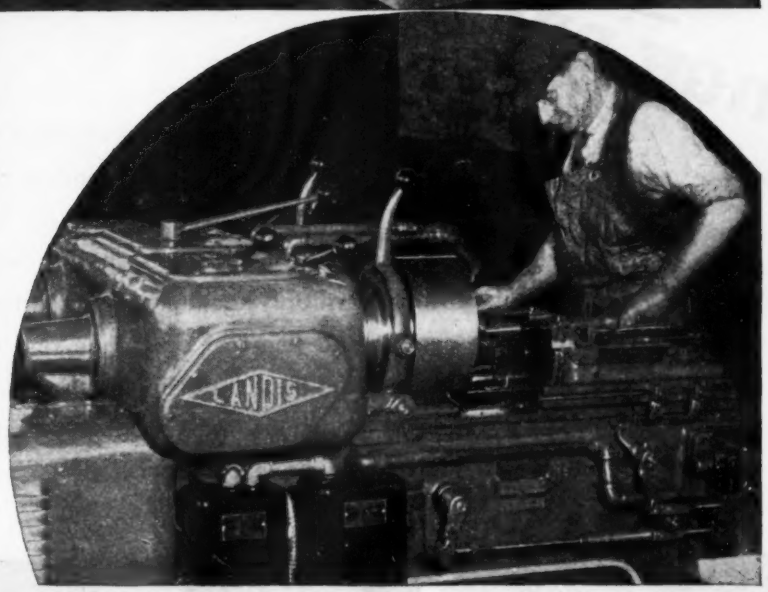
Reasons for the Superiority of

LANDMACO THREADING MACHINES

Self-contained selective type gear box provides eight spindle speeds • Flood lubrication for all gears type pump direct driven and automatically reversible • Built-in pump can be removed without piping • Motor-in-base affords compact and efficient motor drive • Friction clutch control • Head automatically • Hand lever for opening and closing head • Semi-steel bed of box type reinforced Minimum die head overhang • Adjustable vise easily lined up with spindle • Oil reservoir lubricates pads in carriage base • Gibbed carriage compensates for wear • The heavy rim of vise hand-wheel, fect, facilitates gripping of work • Guards completely cover and protect guides







MACHINE CO. WAYNESBORO PENNA. U.S.A.

COLLAPSIBLE TAPS • PIPE THREADING AND CUTTING MACHINES

THE INDUSTRIAL WEATHER MAP SHOWS

HIGH PRESSURE in the SPLINE & GEAR AREA

Because we foresee a shortage of spline and gear parts during reconversion, we have established a contract department for this sort of work.

Manufacturers of automotive and aviation units, who find that their own facilities are not capable of supplying their assembly lines, may be certain of production on the newest and finest of our spline and gear grinders by men who understand and appreciate the full possibilities and superiorities of their machines.

Fitchburg planning engineers will cooperate with you without obligation. Write to us as soon as you have blueprints.

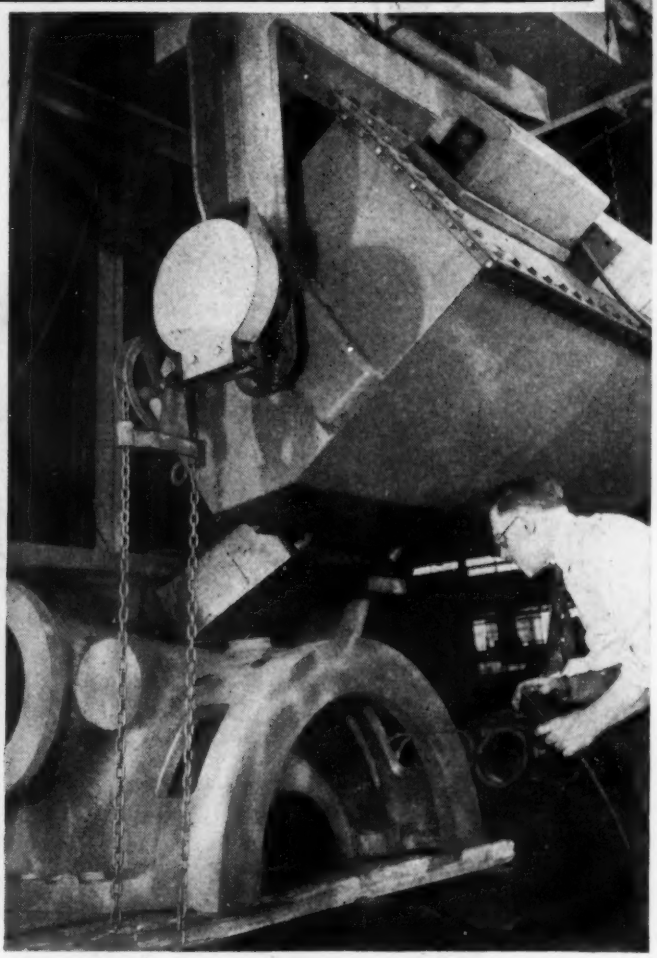
FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of—Bowgage Wheelhead Units. Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.

ALLIS-CHALMERS ELECTRODES HAVE GOT TO BE GOOD!

BECAUSE: 1) We use them *ourselves* — tons of them a day... 2) We constantly check weld metal by X-Ray, tensile machine, metallographic microscope, etc. — to be *sure* A-C electrodes are coming through right.



1 Builders of the greatest variety of capital goods in the world, Allis-Chalmers is also one of the world's largest *users* of welding equipment. Thus we ourselves use Allis-Chalmers electrodes for practically *every* type and size of welding job known to industry. In one A-C shop alone over one and a half tons of arc welding electrodes are used every day. That means Allis-Chalmers electrodes are being continually tested *in production*—under *all* welding conditions.

2 Soundness of weld is determined by modern research equipment such as the above giant 400,000 v X-Ray machine—being maneuvered into position to "shoot" part of a high pressure turbine. This positive, non-destructive method of weld examination provides a *direct* check on electrode performance. Yes, Allis-Chalmers electrodes have *got* to be good! You can get them at our nearby district office or welder dealer. Send for bulletin B6340. A 1808

ALLIS-CHALMERS, MILWAUKEE 1, WIS. ♪ *Tune in Boston Symphony, Blue Network, Sat. Eves.*

A-C Electrodes
EASY TO REMEMBER
EASY TO BUY
Sold by AWS Number

HEADQUARTERS FOR WELDING EQUIPMENT

AMPAC A-C WELDERS

WELD-O-TRON D-C WELDERS

ARC WELDING ACCESSORIES

DETROIT PUBLIC LIBRARY

Leads in Design To Simplify

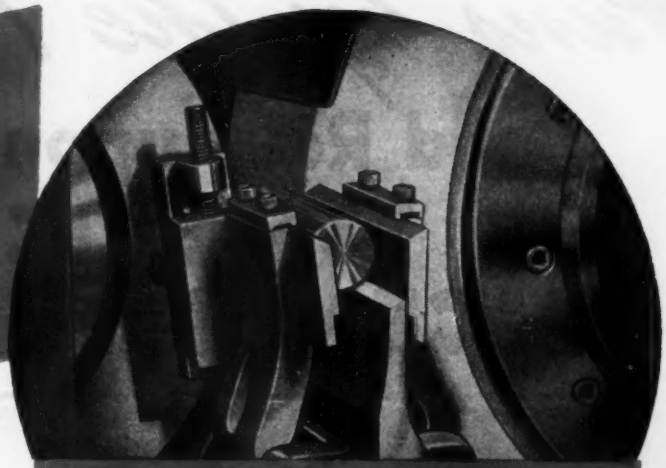
Landis Tool #12 Centerless grinding machine—capacity $\frac{1}{16}$" to 3½" diameter. Thrufeed or infeed operation for round or tapered work.

LANDIS TOOL

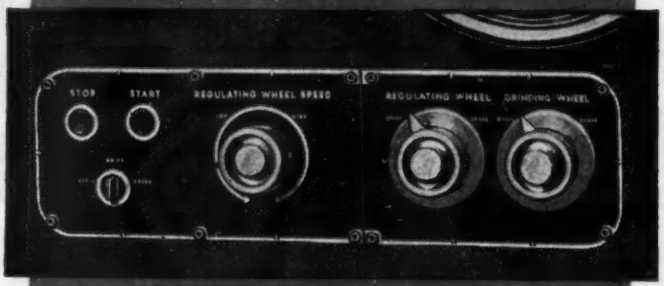
Precision Grinders

LANDIS TOOL COMPANY

Centerless GRINDING OPERATIONS



Regulating wheel is dressed by means of the hydraulically operated cross slide which moves the wheel across the diamond rigidly mounted in the work rest. Wheel is dressed at exact point of contact of work being ground.



Main control grouping includes master start and stop buttons giving operator constant and instant control. Also three-way selector switch for set-up, grinding, and dressing. Separate adjustments provide regulating wheel speed adjustment and speeds for dressing both wheels.

Regulating wheel base is completely self-contained and powered by a variable speed motor which permits speed adjustments without interruption of grinding cycle. Wheel base can be tilted, swiveled and has a hydraulically operated cross slide.

Correct Functional Design
Saves Operation Time
Speeds Output
Increases Production

"No machine tool is ever good enough if it can be made better" is a working principle always applied to Landis Grinder design and manufacture. As a result, the new Landis #12 Centerless Grinder incorporates every modern improvement and design feature that provides for operational ease, speed and efficiency. Specific advances in its design are:

- Grinding wheel dresser rigidly mounted directly above wheel. Hydraulic control readily accessible from operating position. Ear phone attached to dresser mechanism to determine when diamond is in contact with wheel.
- Regulating wheel base and hydraulic cross slide mounted on swivel for grinding taper work. Eliminates need for taper dressing of wheel which causes excessive wheel loss.
- One shot lubrication supplies oil to guide surfaces, feed screw and nut of wheel bases eliminating need for numerous grease gun fittings and oil cups.
- Grinding wheel base adjustable toward or away from work to compensate for wheel wear and varying diameter
- Convenient three-way valve controls coolant to diamond when dressing, to work when grinding or cuts off flow entirely.

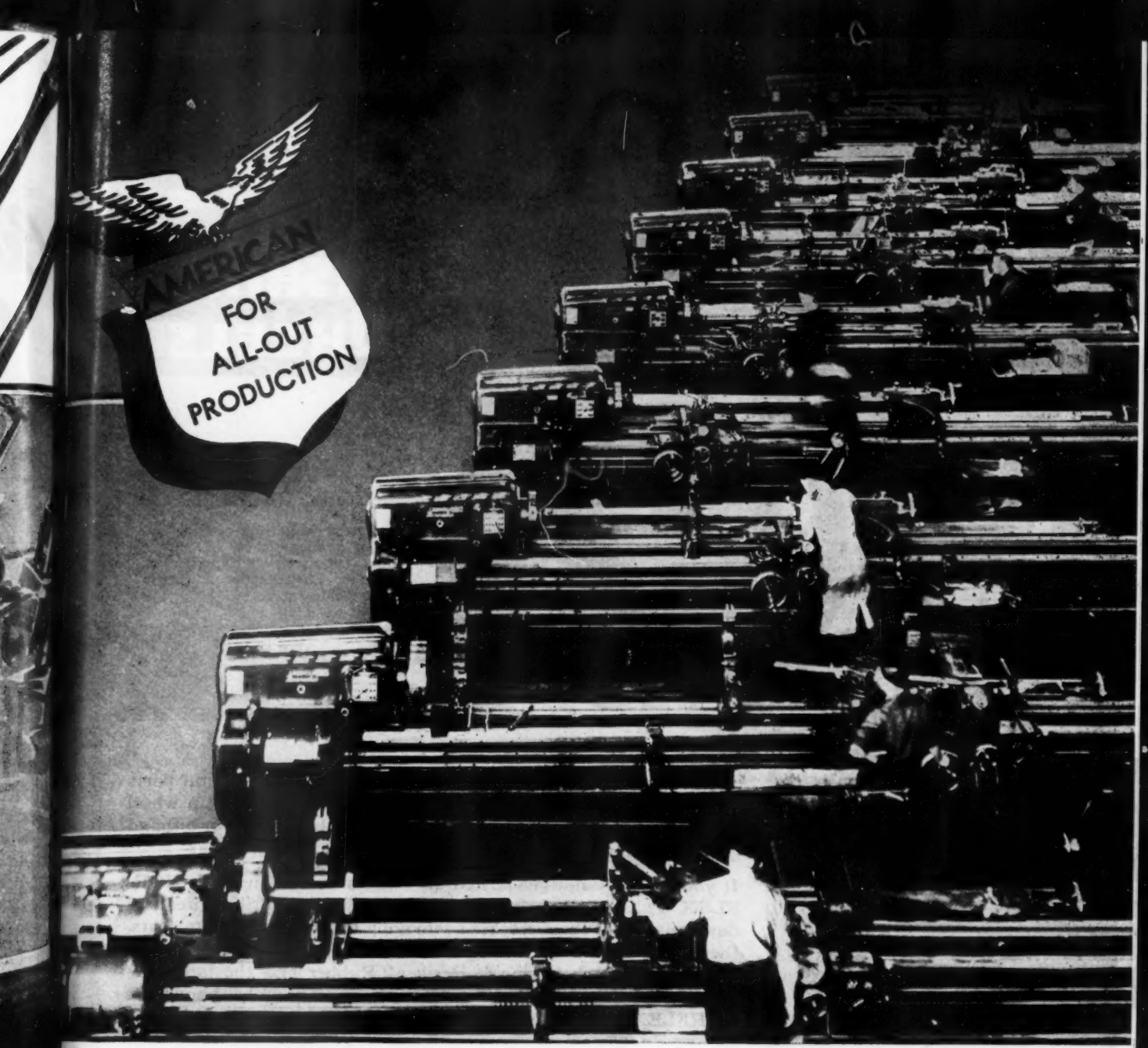
For complete information on the features of the new Landis Tool #12 Centerless grinding machine, write for catalog T44. 19

LANDIS TOOL *Company*

WAYNESBORO, PENNA.

Guns by the Thousands!!

and Row upon Row of "AMERICAN" PACEMAKER LATHES



...producing them in the Plant of THE DOMINION ENGINEERING CO.

Our fighting forces need guns and more guns and they are getting them i ever increasing numbers.

In the gun plants of this country and Canada "AMERICAN" Lathes a meeting every challenge of increased schedules. They are producing as they nev produced before and at the same time are maintaining amazing standards of accurac

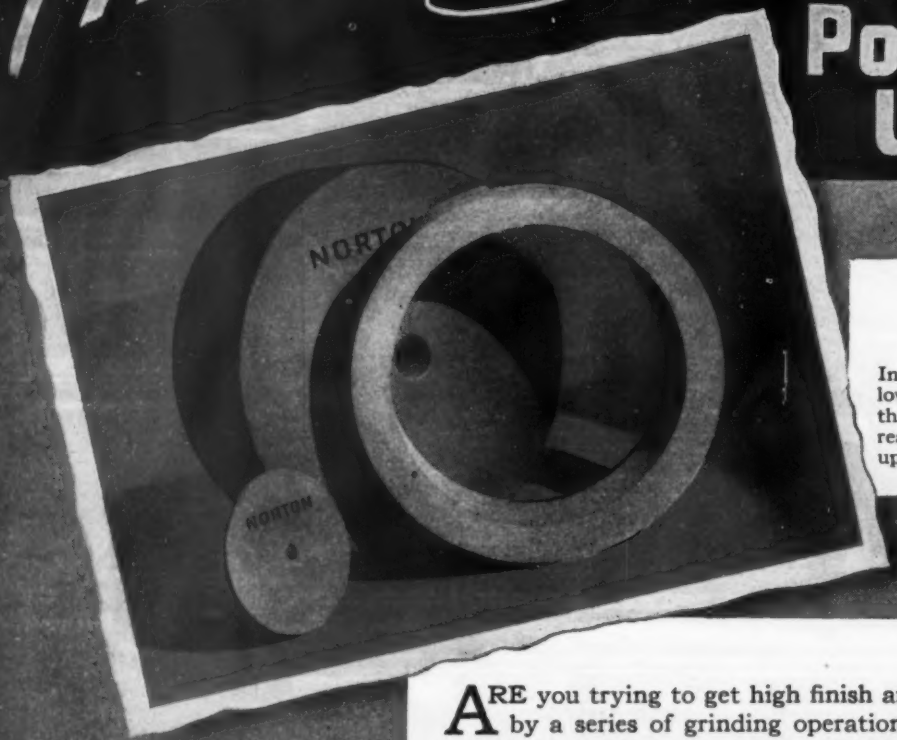
For all-out production, call on "AMERICAN".

THE AMERICAN TOOL WORKS COMPANY

Lathes - Radials - Shapers

CINCINNATI, OHIO, U. S. A.

Announcing NORFLEX Polishing Wheels!



TYPE C
CORK RESINOID

Interested in getting readings as low as 2 microinches? Then try these and see what perfection really is. For operation at speeds up to 6000 s.f.p.m.

ARE you trying to get high finish and accuracy on metal parts by a series of grinding operations followed by set-up wheel polishing? Or removing tool marks from milling, boring or offhand grinding operations by filing, scraping and finally polishing?

If you are, why not get posted on what is being done with NORFLEX* Polishing Wheels. From polishing a tap or drill to breaking down corners of sheet stock, or removing nicks or burrs from gears, they cover the field thoroughly and completely. They come in three types, Cork Resinoid, Resilient Rubber and the latest development—Fiber Resinoid. All three will now be known as NORFLEX* Polishing Wheels—all three develop a high finish.

We could tell you how they are made and what's in them, but do you really care how we do it as long as they turn the trick for you—fast, economically and efficiently? Order them today, use them and then buy Bonds with the added savings.

NORTON COMPANY, WORCESTER 6, MASS.

*Trade-mark

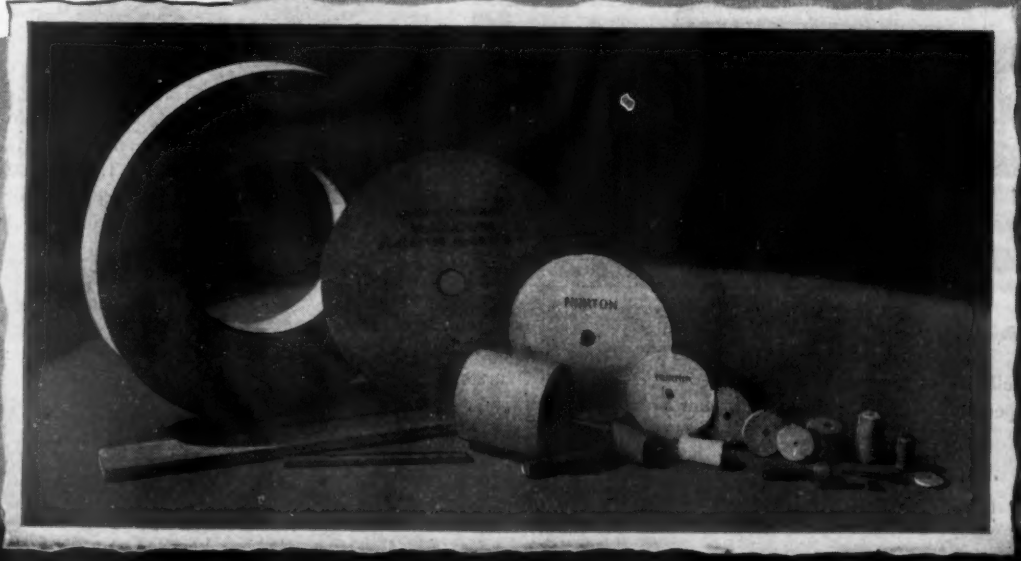
W-888

TYPE R
RESILIENT RUBBER

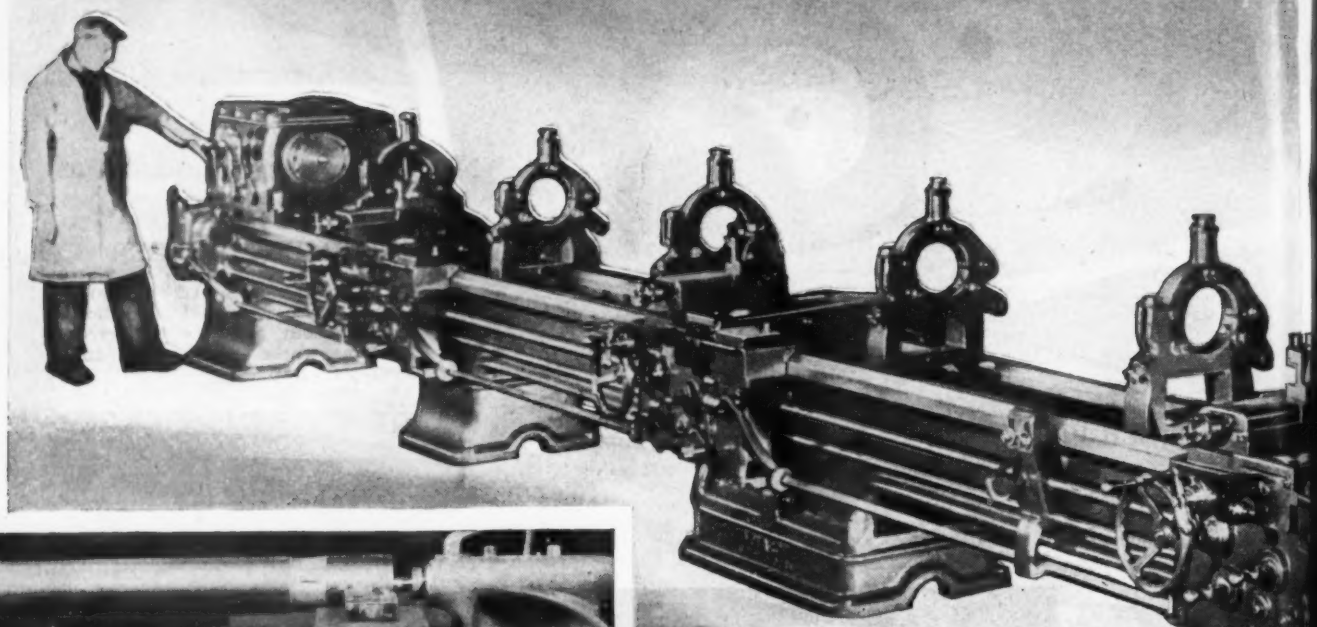
Do you like that s-o-f-t resilient action, where the wheel hugs the work without bump or chatter? Then use these for operation at 3300–6000 s.f.p.m.

TYPE F
FIBER RESINOID

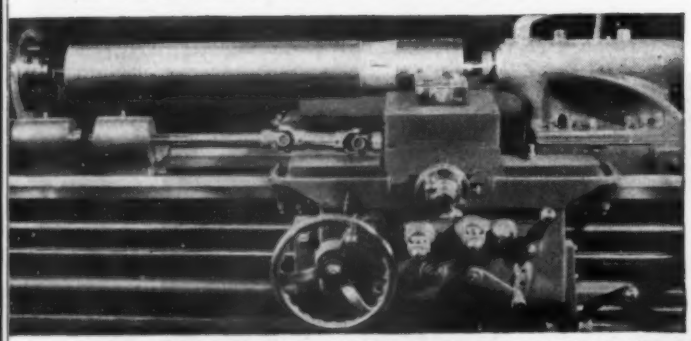
Want to combine a light grind plus a polish in one operation? Use these for operation up to 7500–9000 s.f.p.m.



To reduce your turning



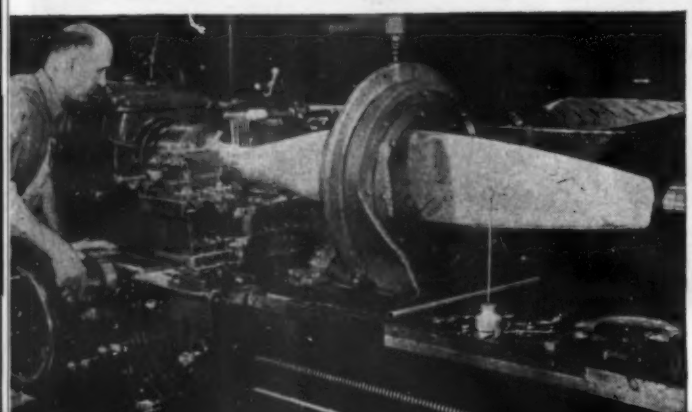
By using three carriages, operating simultaneously, two-thirds reduction in the machining time of periscope tubes was effected by this Monarch machine. The 40′ bed is made in two sections, joined together as accurately as if made in one piece. Steady rests shown are standard Monarch units.

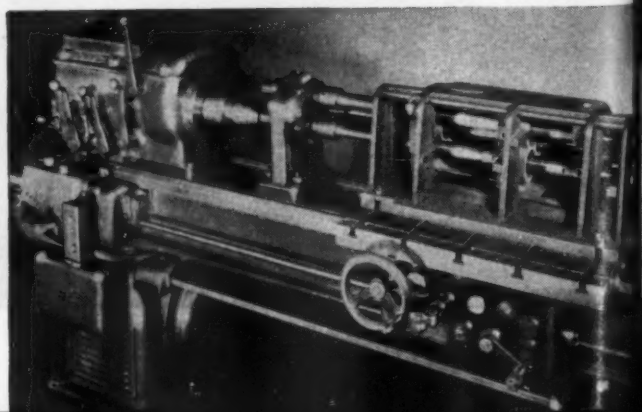


A special contour shape turning device on this standard Monarch lathe was developed to speed delivery of landing gear struts. A large number of these special Monarchs are used in all plants producing this work.

Machining the hub end of this propeller blade requires 13 tools, but is done in one setup on this Monarch lathe. One large propeller plant uses several of these lathes for this purpose.

One operator can handle several of these Monarch lathes, used in our own plant as horizontal boring machines. They are equipped with special type platen carriages, on which the work-holding boring fixtures are mounted. These machines reduce production costs and assure accurate duplication.





costs... SEE MONARCH

Illustrated here are a few of the many ingenious time-saving applications of standard or special Monarch lathes for war production. Postwar, machines such as these will more than pay their way by delivering increased output of high quality turning, boring or facing work. Especially, they will help offset higher man power costs. If you would like a demonstration of how Monarch turning machines can be profitably applied to your work, our engineers are at your service.

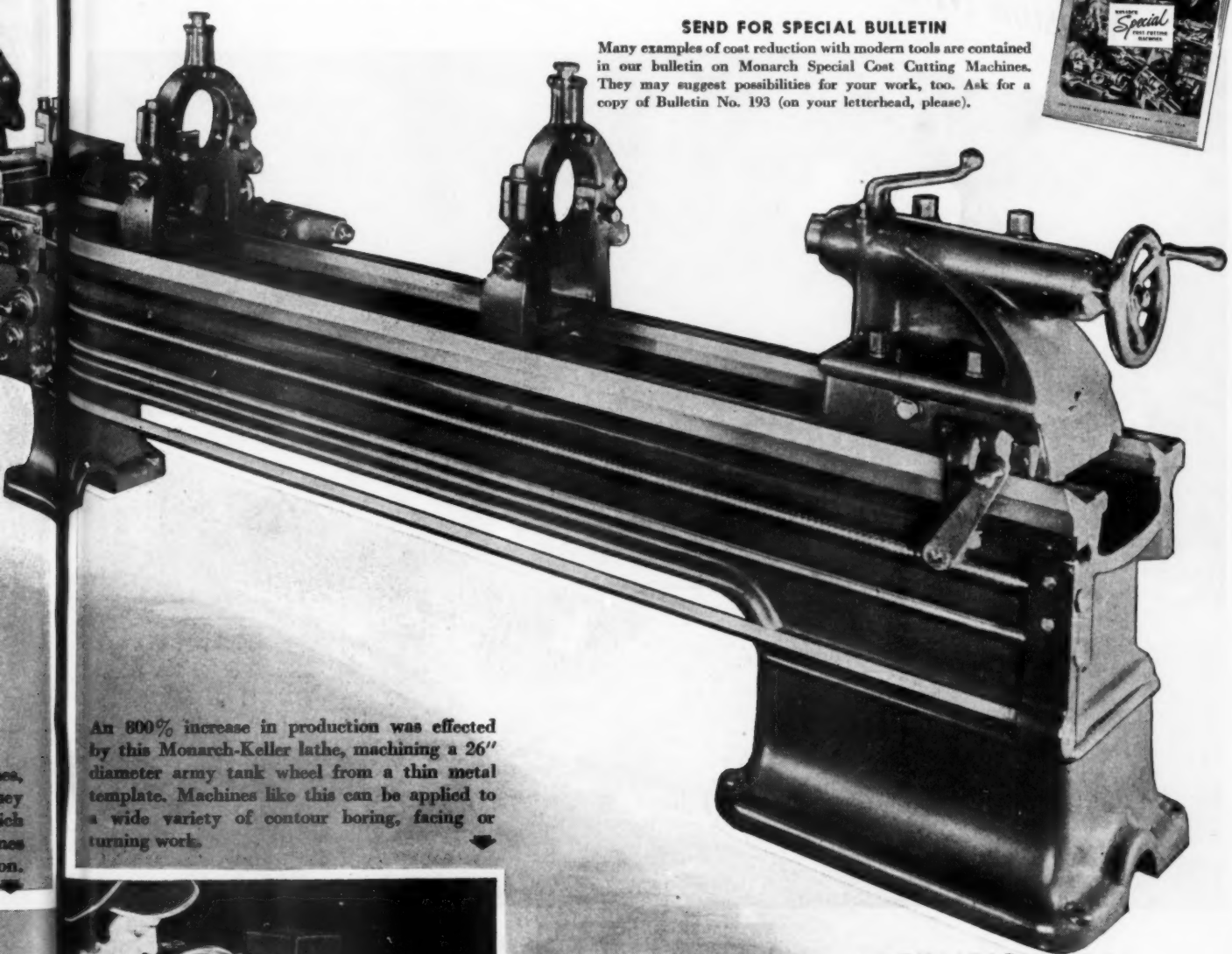
THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

DIRECT FACTORY BRANCHES:

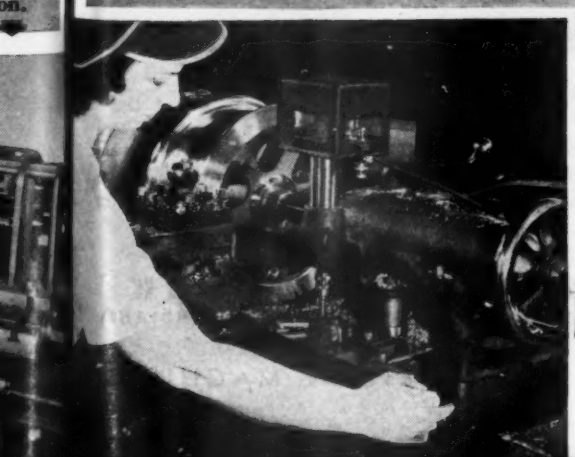
801 Fisher Bldg., Detroit 2, Mich.
622 W. Washington Blvd., Chicago 6, Ill.
1060 Broad Street, Newark 2, N. J.
512 Empire Bldg., Pittsburgh 22, Pa.
10465 Carnegie Ave., Cleveland 6, Ohio
Representatives in principal cities

SEND FOR SPECIAL BULLETIN

Many examples of cost reduction with modern tools are contained in our bulletin on Monarch Special Cost Cutting Machines. They may suggest possibilities for your work, too. Ask for a copy of Bulletin No. 193 (on your letterhead, please).



An 800% increase in production was effected by this Monarch-Keller lathe, machining a 26" diameter army tank wheel from a thin metal template. Machines like this can be applied to a wide variety of contour boring, facing or turning work.



Monarch Saves Time

SOUTH BEND TOOLROOM LATHES

for Close Limit Precision Machining

When unpredictable precision jobs tax toolroom facilities, South Bend Toolroom Lathes help keep the work going smoothly. Their superior design and careful workmanship make close limit toolroom work easier. Their smooth power and rugged construction make them equally popular for exacting production operations.

Versatility is often as important as accuracy. The ease with which set-ups can be changed for numerous precision operations, plus wide ranges of spindle speeds, threading, and power turning and facing feeds effectively contribute to their efficiency. Many attachments are available for special classes of work.

Whether your problem is precision toolroom work, or production machining to toolroom standards, get the full story of South Bend Toolroom Lathes. They will simplify your work. Made in five sizes, 9″ swing to 16″ swing. Write for New Catalog No. 100-D.

SOUTH BEND 16″ TOOLROOM LATHE

SPECIFICATIONS

SOUTH BEND 16″ TOOLROOM LATHE

Swing Over Bed . . . . . 16¼″
Maximum Collet Capacity . . . . . 1″
Bed Lengths . . . . . 6′, 7′, 8′
Spindle Speeds (8) . . . . 21 to 725 r. p. m.
Thread Cutting Range (48) . 4 to 224 per in.

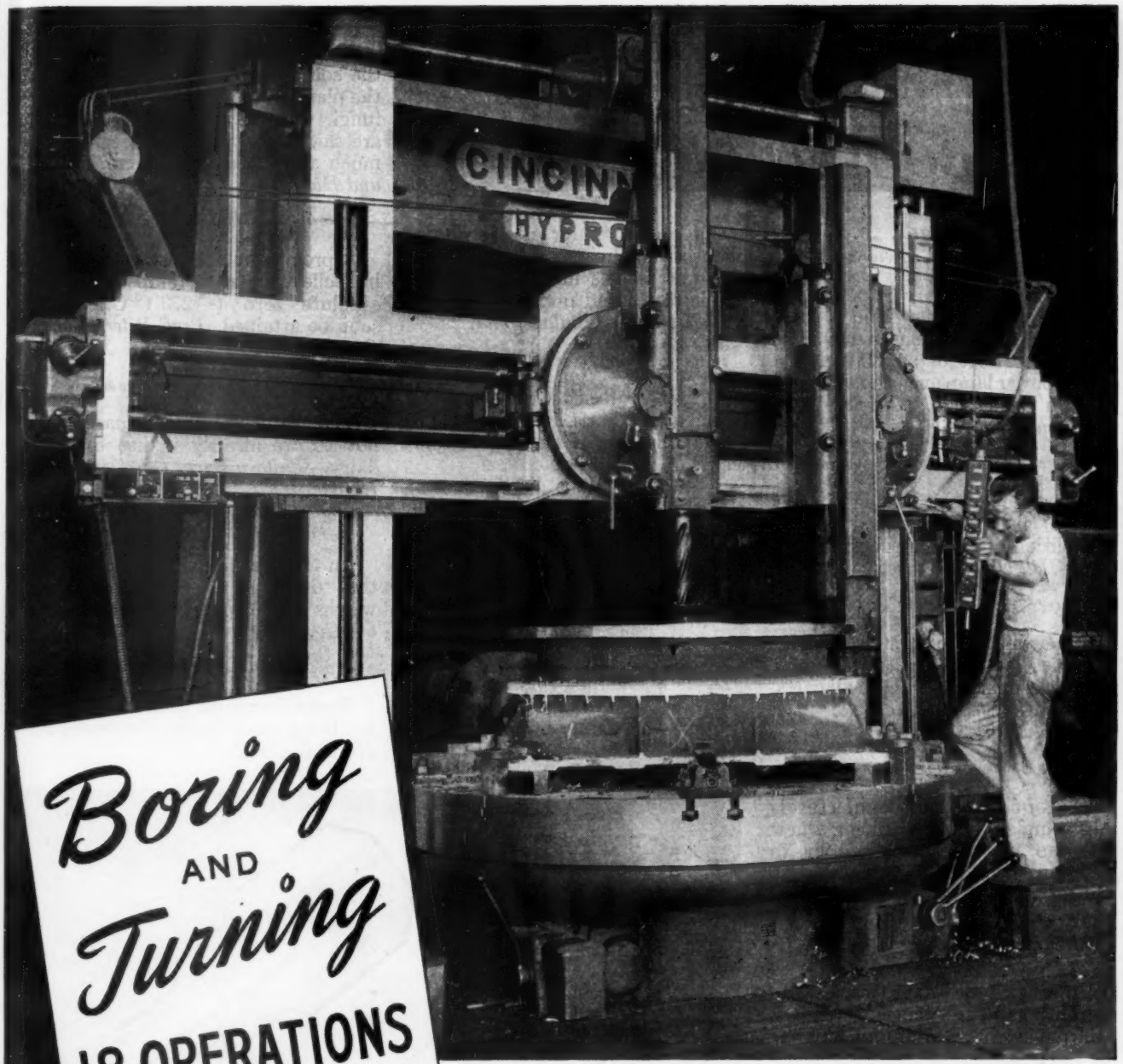
TRAINING HELPS

Sound films, operator's handbooks, booklets, wall charts, and bulletins on lathe operation and care are available for training new lathe operators. Write for Bulletin No. 21-D for full information.

Lathe Builders For 38 Years

SOUTH BEND LATHE WORKS

419 EAST MADISON STREET • SOUTH BEND 22, INDIANA



Boring AND *Turning*

18 OPERATIONS AT ONE SET UP ON 7′ HYPRO BORING MILL

Add to the Cincinnati Hypro Vertical Boring Mill's other points of superiority—Accuracy, Flexibility, Power and Speed—an additional feature illustrated here—Ease of Operation. The casting shown is a cast steel shovel base of 163-212 brinnel hardness. Eighteen operations are performed on this casting at one setup at speeds from 2.4 to 33 R.P.M. and feeds from .015 to .042 per revolution. The entire operation, in addition to setup and tool changes, is performed in 8 hours, 15 minutes at the Lima Locomotive Works Shovel and Crane Division.

Write for Bulletin 132 describing this versatile mill.

THE CINCINNATI PLANER COMPANY

Planers...Vertical Boring Mills...Planer Type Millers

CINCINNATI . OHIO . U.S.A.

It is reported that . . . . . .

So tough is one new kind of glass that a searchlight lens made of it resists the heat of an 800 million candlepower lamp even though snow falls on the outside. *"Tuf-flex", Libby-Owens-Ford.*

get ready with CONE for tomorrow

Thermite (as used in incendiary bombs) has been applied to the demolition of metal structures. *McGraw-Hill Overseas Digest.*

get ready with CONE for tomorrow

A new magnetic floor sweeper for factories looks like a lawn mower and picks up nails, scrap, small parts, and tools. *Stearns Magnetic Mfg. Co., Milwaukee.*

get ready with CONE for tomorrow

One of our aircraft manufacturers has complete plans for fitting a new fuselage, with luxurious interior, to the wings and engines of war-time bombers. *Consolidated Vultee Aircraft Corporation.*

get ready with CONE for tomorrow

In a newly-designed twelve-story parking garage, a single attendant can put away or bring out any one of 110 automobiles by merely pushing a button. *Park-O-Mat Co., Los Angeles.*

get ready with CONE for tomorrow

Plans are well advanced for annual trade fairs, on the European plan, in several American cities. *Bureau of Foreign and Domestic Commerce, Washington, D. C.*

get ready with CONE for tomorrow

Two hundred police chiefs recently witnessed a demonstration of a tiny radio receiver about the size of a pack of playing cards. *Hytron Corporation, Salem, Mass.*

get ready with CONE for tomorrow

The "Axonograph" is a device that photographically produces an axonometric drawing directly from a blueprint. *Glenn L. Martin Co., Baltimore.*

One manufacturer of electric appliances is already displaying his post-war models in order to gauge public tastes and preferences. *Proctor Electric Co., Philadelphia.*

get ready with CONE for tomorrow

"Fly-it-yourself" service is being planned on a basis similar to that of the familiar rented automobile service. *R. S. Robie, Boston.*

get ready with CONE for tomorrow

A "slot-machine" mail box accepts payment, stamps a letter and holds it for collection. *"Mailomat", Pitney-Bowes, Stamford, Conn.*

get ready with CONE for tomorrow

A new molding plastic is non-organic and will stand heat to 420° centigrade. *Mycatex Corp., Clifton, N. J.*

A new chemical, when sprayed on the soil of gardens, is absorbed by the plant and kills many insects and fungi. By this means potato crops are said to have been increased as much as 40 bushels per acre. *Rohm and Haas Co.*

get ready with CONE for tomorrow

A prominent scientist states that he believes that a temperature of absolute zero (—273.1° C.) may soon be attained. *Prof. Peter Debye, Cornell Univ.*

get ready with CONE for tomorrow

The new space-saving square milk bottles are already in use by one dairy. *Sanitary Farm Dairies, Cedar Rapids, Iowa.*

get ready with CONE for tomorrow

An electric motor has been built that develops 30 horsepower and weighs only 57 pounds. *General Electric Co.*

get ready with CONE for tomorrow

Paper forms for poured concrete are being used. *Sonoco Products Co., Hartsville, S. C.*

Ultimate Accuracy
IN PRECISION CHECKING OF GAGES AND LAPPED PARTS
assured by

Van Keuren

FUSED QUARTZ OPTICAL FLATS

The use of optical flats for precision measurements with light waves was pioneered by The Van Keuren Co. in 1920. The new Van Keuren double surface, pure fused-quartz flats are the result of 25 years of experience. The accuracy and workmanship is superlative.

Fused quartz is highly transparent and has exceptional wearing qualities. The expansion and contraction due to temperature change is 1/16 that of plate glass and 1/6 that of pyrex.

Specify Van Keuren double surface, fused-quartz optical flats for checking flatness of precision lapped parts, maintenance of amplifying gages, and control of gage block wear. They are the most economical to purchase and the most accurate to use.

Worn spot .000023" deep revealed on amplifying gage anvil by means of a Van Keuren optical flat.

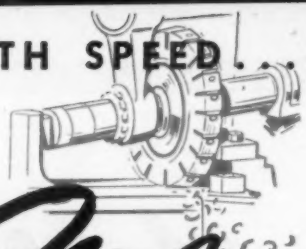
Consult the 144-page Van Keuren Catalog No. 32 for further details. Send for your copy which also contains complete tables, data and formulas for measuring threads, gears, gages and precision parts.

THE Van Keuren CO., 176 WALTHAM STREET, WATERTOWN, MASS.

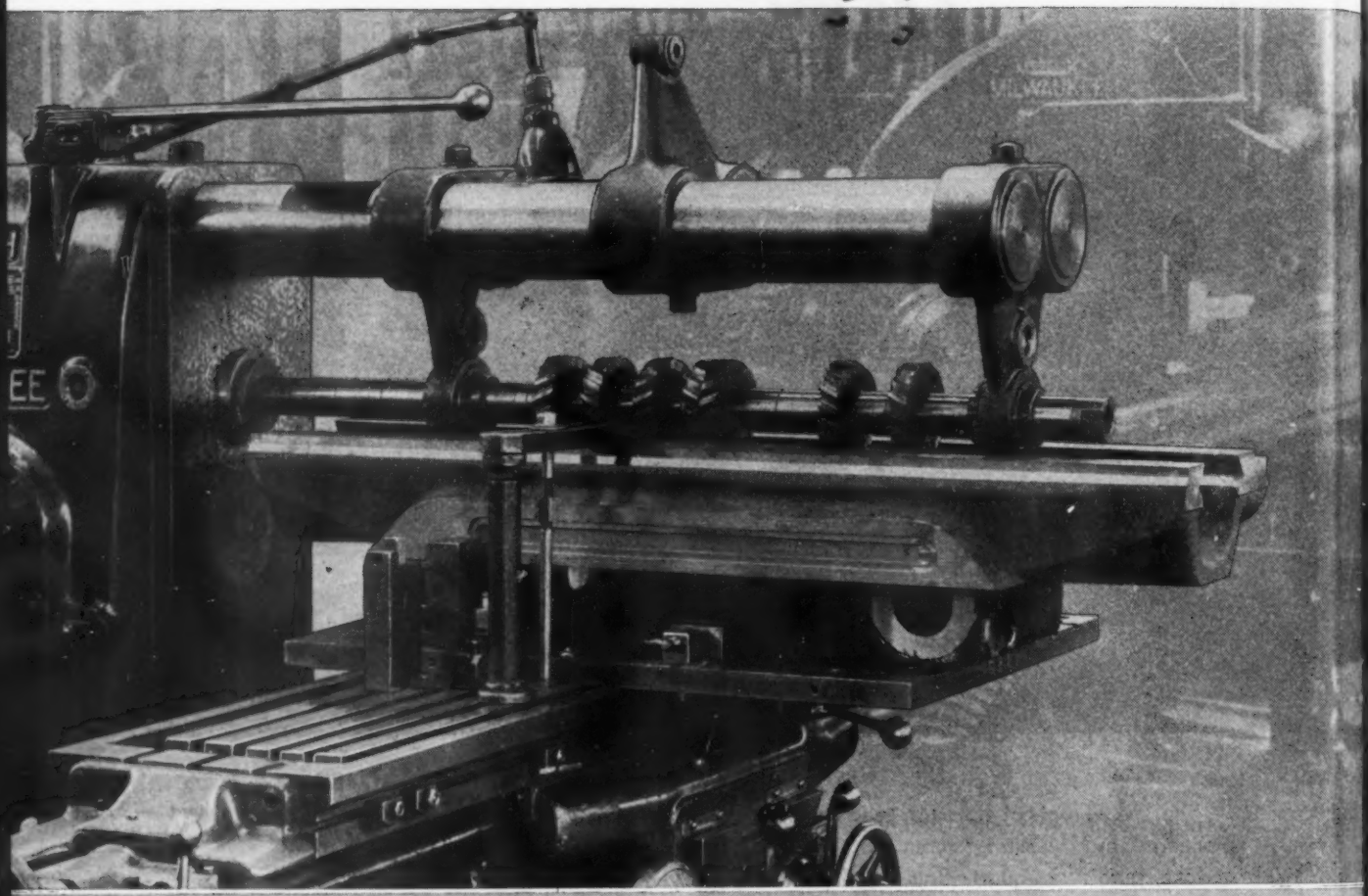
25th YEAR

Light Wave Equipment — Light Wave Micrometers — Gage Blocks — Taper Insert Plug Gages — Wire Type Plug Gages — Measuring Rolls — Thread Measuring Wires — Gear Measuring System — Shop Triangles.

TO MILL IT . . . WITH SPEED . . . PRECISION . . . PROFIT



"PUT IT ON A *Milwaukee*"

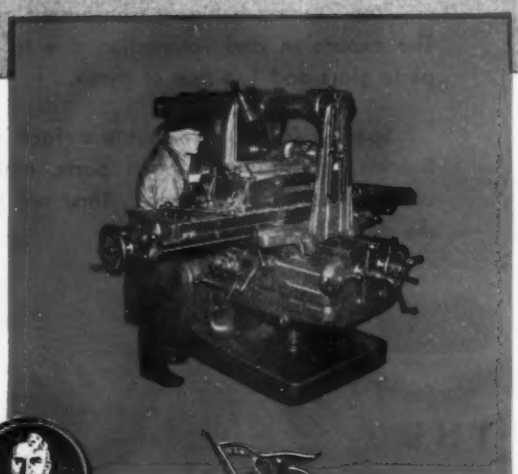


Five side-milling cutters and one pair of interlocking side-milling cutters are mounted on a special 51-½B42 Milwaukee Arbor held in the spindle of a Milwaukee 4H Milling Machine. Two arbor braces support the arbor while a third increases overarm rigidity. Seven faces are straddle milled simultaneously in this set-up in which the knee is fed vertically.

Taking the tough jobs in stride — setting the pace in production milling — standing up with precision performance through the years — these qualities have made "Milwaukee" a top ranking name in milling machines.

Their ability to crack many a milling problem is reflected in the popular expression of machine tool men—"put it on a Milwaukee." Time-tested, production-proved, modern in every detail of design and construction but free of frills and novelties Milwaukee Milling Machines yield the sustained performance — with precision and speed — that spell profit in milling operations.

Select your milling equipment from the Milwaukee line of more than 70 models — the PoweRated Milling Machines — every machine engineered and built with ample power for every class of job.



Milwaukee Machine Tools

KEARNEY & TRECKER
CORPORATION
MILWAUKEE 14, WISCONSIN

THE RIGHT WHEEL FOR THE RIGHT JOB!

• For every abrasive engineering problem, there's a specific solution. It may be in the newest Mid-West grinding wheel—a wheel that cuts cool and stands up to the toughest grinding job long after the ordinary wheel's usefulness is over.

But whatever the abrasive need, there's a Mid-West item to meet it. Mid-West sandpapers, honing stones, rubbing bricks, sharpening stones, compounds or wheel dressers—all are products of unassailable quality.

You'll find a specific solution to your abrasive problem in the Mid-West line.

MID-WEST ABRASIVE CO.

Manufacturers of DEPENDABLE Abrasives

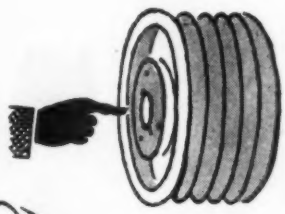
Owosso, Mich. 1960 E. Milwaukee, Detroit 11, Mich. Rochester, Pa.

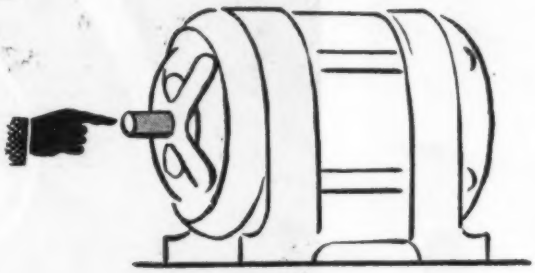
BUYERS—Send for the Mid-West Abrasive Company's grinding wheel catalogue—a complete data book giving you detailed recommendations on your grinding problem. Mid-West Abrasive Company, 1960 E. Milwaukee Avenue, Detroit 11, Michigan.

NAME_____

ADDRESS_____

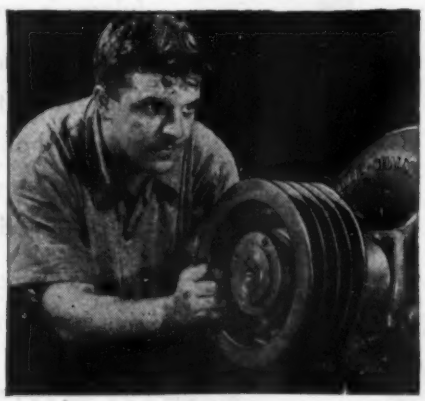
See how Easy it is to put this on this





One quick operation and Allis-Chalmers' new "Magic-Grip" — *fastest mounting sheave on the market* — is locked securely to shaft... saving you time, money, trouble!

1 Place sheave on shaft. Slides on smoothly because clearance is provided by expanded bushing. There's *no* hammering — *no* forcing! Complete sheave and bushing unit comes intact—ready for quick, easy mounting.



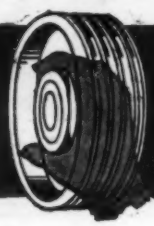
2 Slide to desired position. Sliding easily, sheave can be placed *exactly* according to straight-edge ... giving you true alignment with resulting smooth performance. A minimum of time is required.

3 Tighten three capscrews — and it's ready to go! Entire sheave is locked securely to shaft and *grips like magic!* No set screws to damage shaft. Send for Bulletin B6310. Allis-Chalmers, Milwaukee 1, Wis.

A 1750

Allis-Chalmers Texrope

"MAGIC-GRIP"



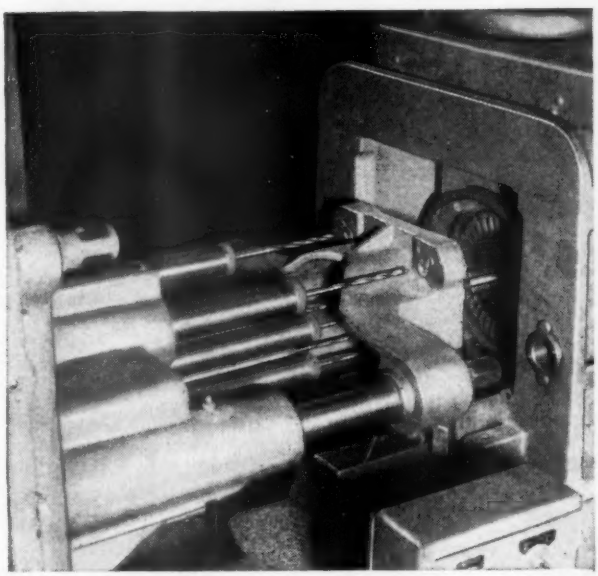
SHEAVES

BLESSED BOLT HOLES

It's a blessing to electricians and maintenance men when bolt holes in motor end shields and frames are exactly in line, and mounting holes in the feet are uniformly and accurately positioned. Installation is easier. Interchanging of motors, rotating of end shields, and reversal of stators are all more quickly accomplished. Tight fits are obtained without forcing. Bearing alignment is insured, internal strains are avoided. During the war period, jig-fixture uniformity maintained in machining, drilling, and tapping Tri-Clad motor frames has saved thousands of man-hours of installation and servicing.

End shields are easily rotated for inverted motor mounting.

JIGS AND FIXTURES OF ADVANCED DESIGN MEAN CLOSE FITS IN TRI-CLAD MOTORS



Specially built production equipment, as well as test apparatus, helps build Tri-Clad motors with close fits and clearances. Here, all bolt holes in the frame are drilled in a single operation within a rigid fixture that insures accurate positioning. In the finished motor, this results in more accurate shaft alignment, smoother operation, longer bearing life. General Electric's high-volume motor production permits tooling up for high precision without increasing the cost to you. *General Electric Co., Schenectady 5, N.Y.*

Frame-drilling operation at G.E.'s Lynn (Mass.) Works.

GENERAL ELECTRIC

Buy all the BONDS you can—*and keep all you buy.*

Use the ROTOMILL
...INSTEAD OF THE LATHE

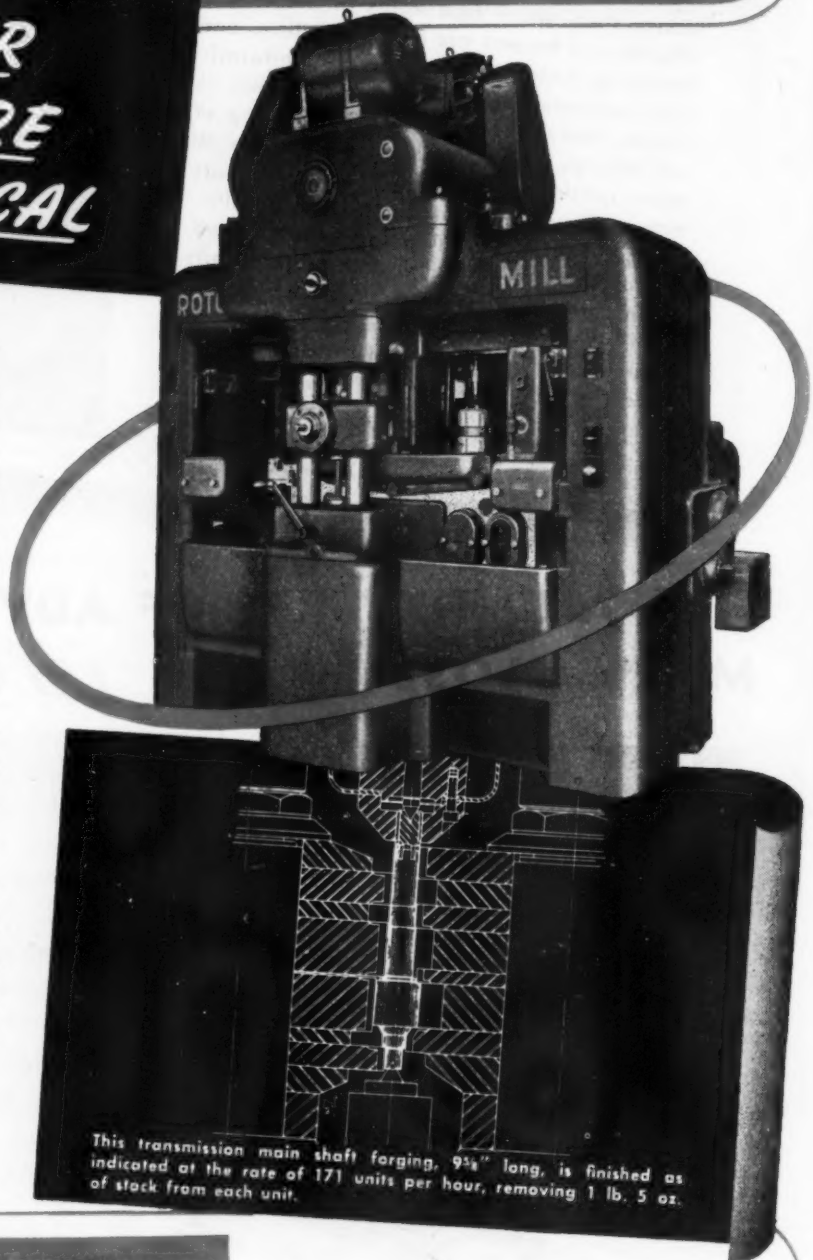
It's FASTER and MORE ECONOMICAL

Machining cylindrical, conical or flanged work such as gear blanks, shafts, steering knuckles, etc. can be done more effectively on the RotoMill than it can on the lathe. A tolerance of .004" in diameter is normally maintained thus eliminating in many cases a final finishing cut.

Metallurgical changes in the surface metal of the work part due to cold working do not occur because there is very little rise in temperature during the cutting operation. For the same reason cutter life is surprisingly long.

A cutter change, when cutters are kept in sets mounted on solid arbors, can be made in about fifteen minutes. Thus the RotoMill is just as effective on short runs as it is on long production jobs.

WRITE
FOR DESCRIPTIVE BULLETIN



This transmission main shaft forging, 9⅝" long, is finished as indicated at the rate of 171 units per hour, removing 1 lb. 5 oz. of stock from each unit.

NATIONAL BROACH AND MACHINE CO.

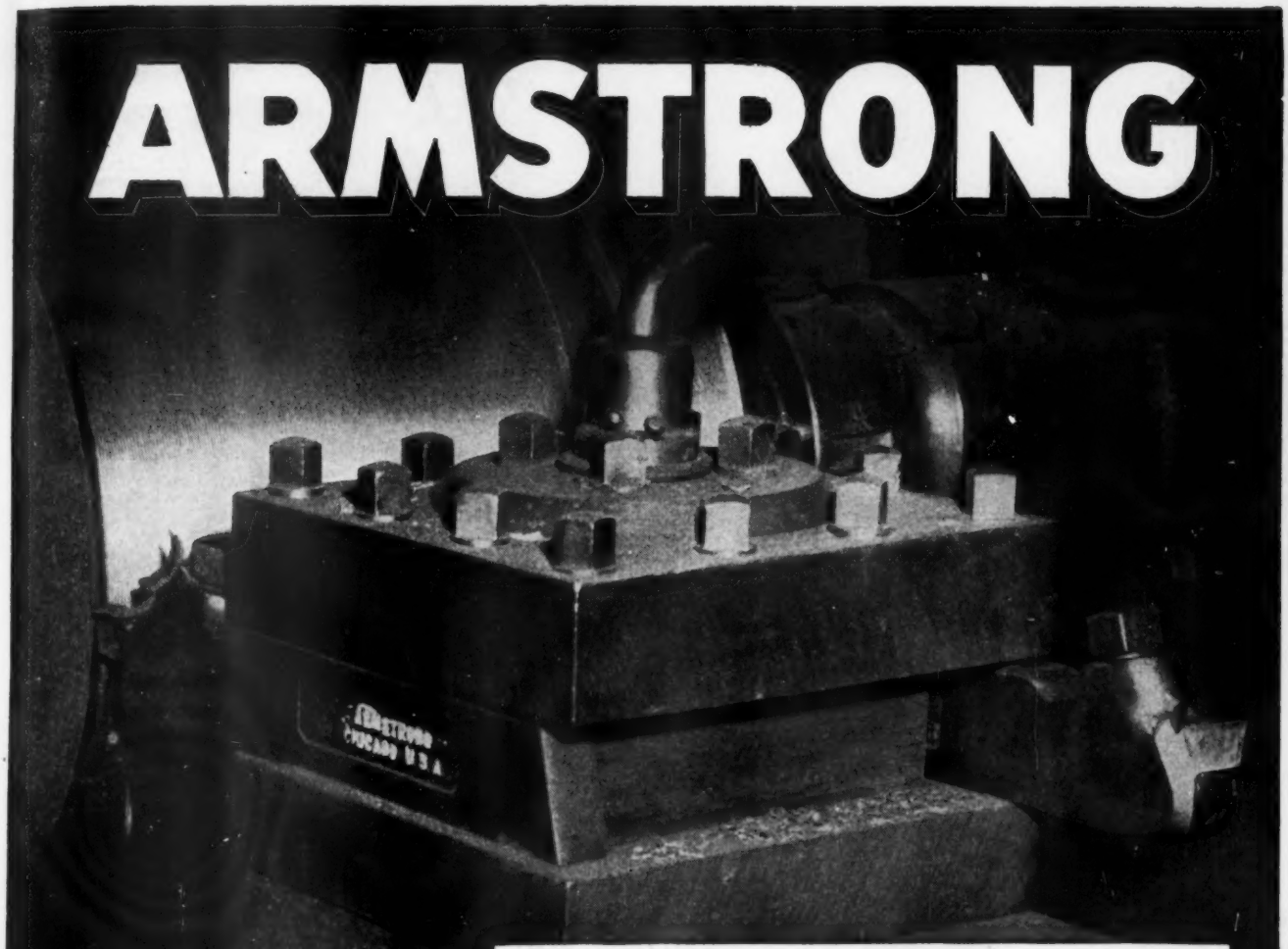
RED RING PRODUCTS

5800 ST. JEAN • DETROIT 13, MICH.

Specialists on SPUR AND HELICAL INVOLUTE GEAR PRACTICE

Originators of ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

ARMSTRONG



New drawings, new operations, but the same ARMSTRONG TOOL HOLDERS

When war came, thousands of plants laid aside their prints and their gauges, re-arranged their schedules, and with the same ARMSTRONG TOOL HOLDERS which they had used for civilian manufacturing, turned to the production of war materials. In the same manner, after victory, it will be with new drawings and these same ARMSTRONG TOOL HOLDERS, that normal peace time production will be resumed on lathes, planers, slotters and shapers.

Permanent, multi-purpose tools, used in over 96% of the machine shops and tool rooms, ARMSTRONG TOOL HOLDERS are essential to American Industry, in peace or war. They are the standard tools for basic machining operations, which with American ingenuity have built and will rebuild America's production greatness.

Whatever your post-war plan or product, you will probably start operation with ARMSTRONG TOOL HOLDERS. Check now to see that you are well supplied with the types and sizes you will need.

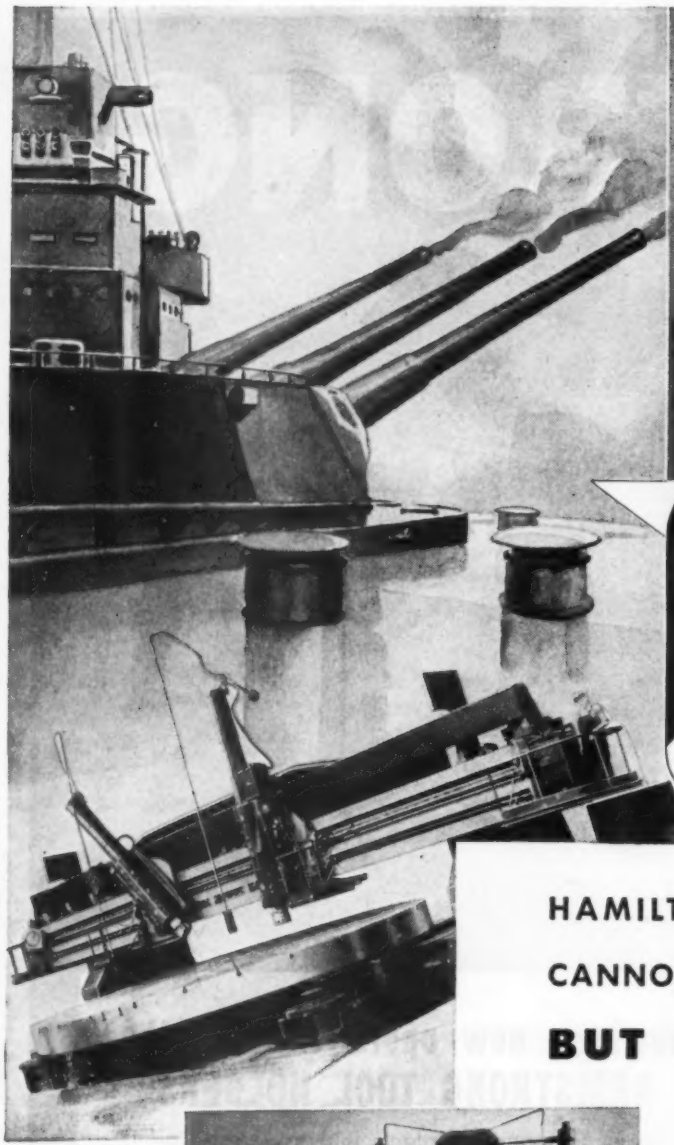
ARMSTRONG BROS. TOOL CO.

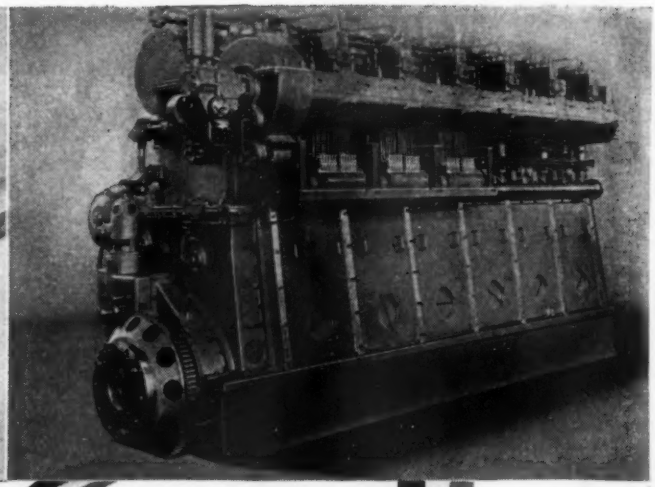
"The Tool Holder People"

315 N. FRANCISCO AVE. CHICAGO 12, U. S. A.

Eastern Warehouse and Sales: 199 LAFAYETTE ST., N. Y. 12, N. Y.
Western Warehouse and Sales: 1275 MISSION ST., SAN FRANCISCO, CALIF.

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms



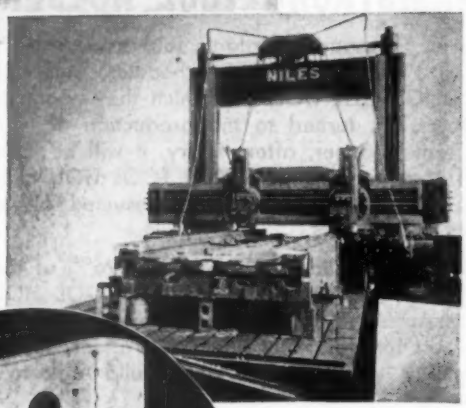


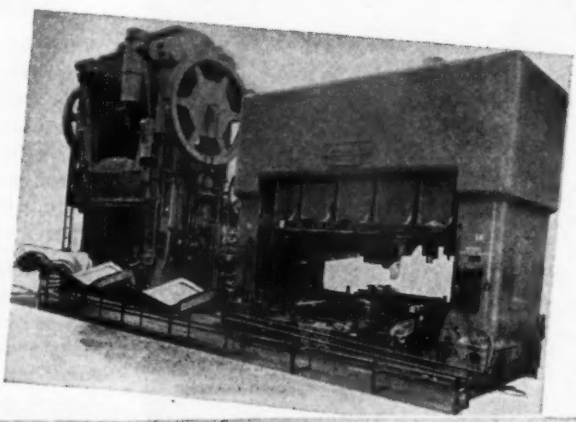
WHAT IT TAKES TO WIN THE PEACE

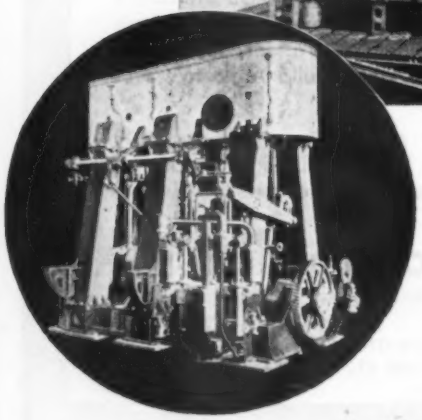
HAMILTON STEAM AND DIESEL ENGINES

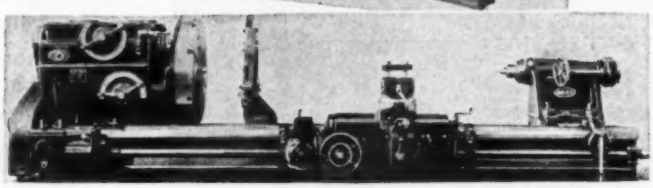
CANNON ★ MACHINERY TO BUILD THEM ALL

BUT KEEP THAT GUARD UP!









GENERAL MACHINERY CORPORATION

HAMILTON, OHIO

THE NILES TOOL WORKS CO. • THE HOOVEN, OWENS, RENTSCHLER CO. • GENERAL MACHINERY ORDNANCE CORPORATION

NICHOLSON

is now in the ROTARY FILE field—"with both feet"

(Hand Cut and Ground types)

NICHOLSON has the mill-supply distributing facilities to assure a near-at-hand source of Rotary Files in the types and sizes you may need.

NICHOLSON has the engineering service to aid in the proper use of Rotary Files; and to help in the selection of *The right file for the job.*

NICHOLSON Rotary Files are as sweepingly guaranteed for quality as the Nicholson hand files famed throughout the world for their slogan—*Twelve perfect files in every dozen.*

HAND CUT

WRITE FOR OUR ROTARY FILE CATALOG

showing both Hand Cut and Ground types. Each type is available in 16 standard styles or shapes; in 3 cuts (Coarse, Medium and Fine); in 64 sizes and in diameters ⅛" to 2".

ORDER THROUGH YOUR MILL-SUPPLY HOUSE

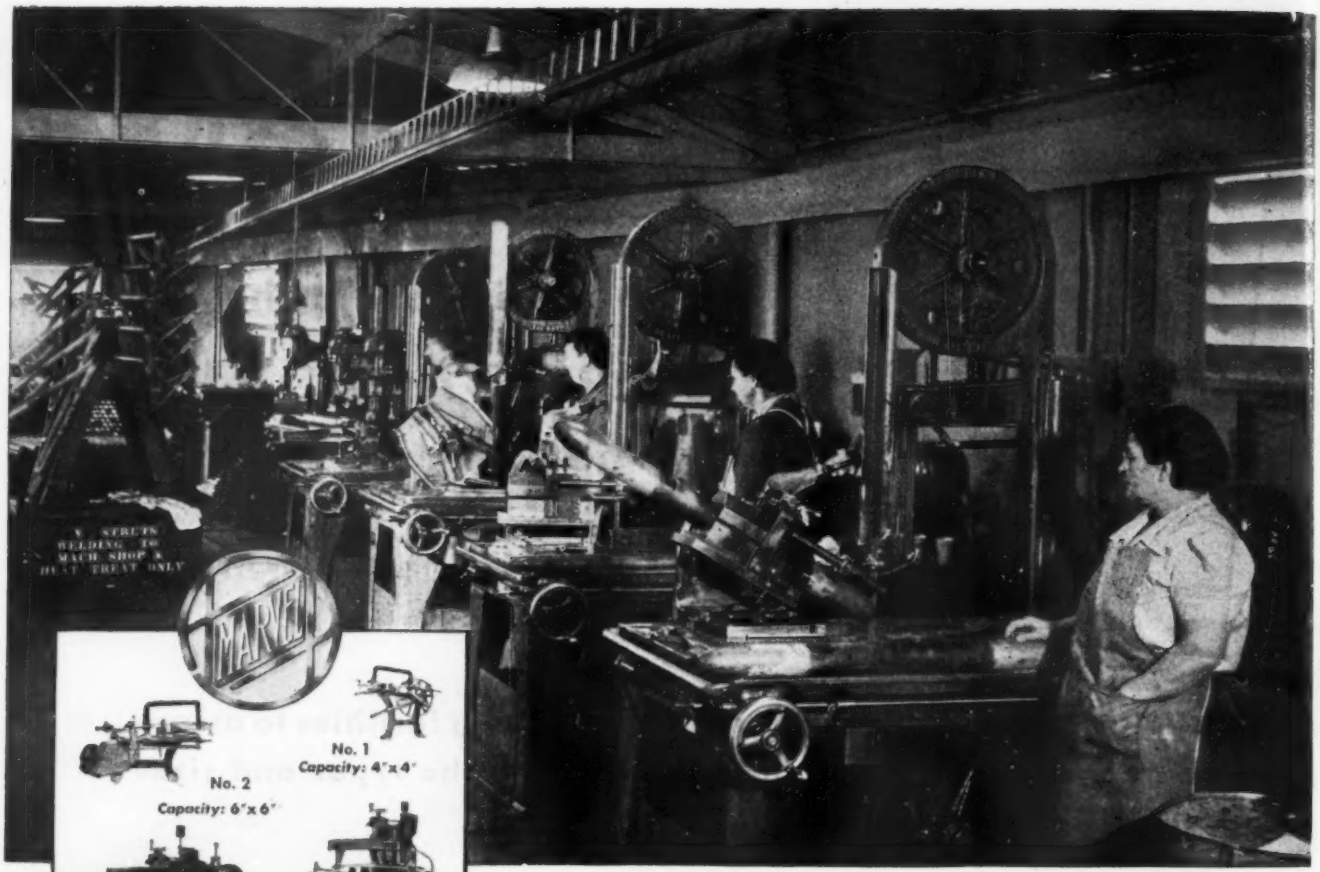
GROUND

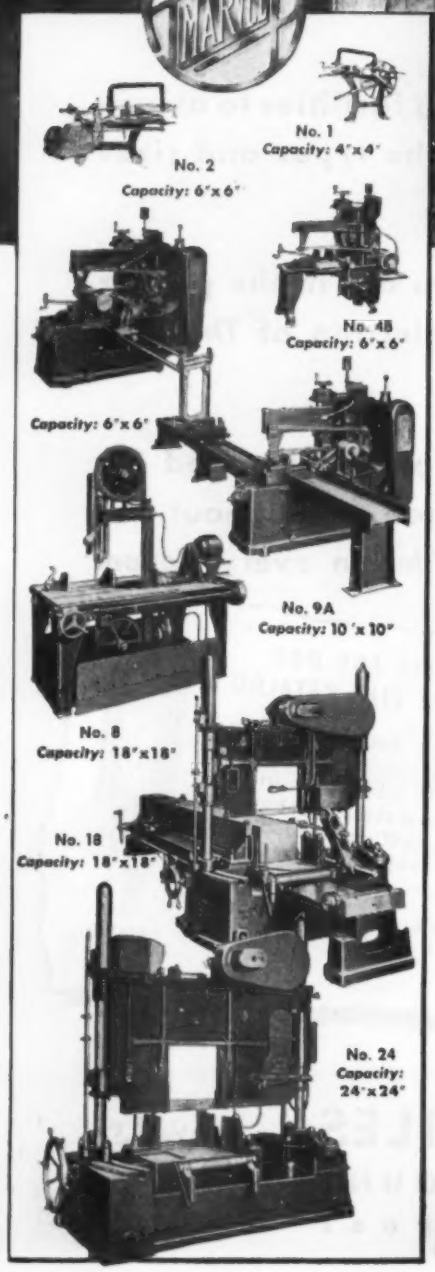
NICHOLSON FILE COMPANY
97 Acora St., Providence 1, R. I., U. S. A.
(In Canada, Port Hope, Ont.)

NICHOLSON ROTARY FILES

HAND CUT and GROUND
FOR EVERY PURPOSE

NICHOLSON U.S.A.





MAKE ANGULAR CUTS ON AWKWARD WELDMENTS EASILY

Illustrated are six of the 13 MARVEL No. 8 Universal Metal Cutting Band Sawing Machines in the plant of the National Supply Company in Torrance, California. They are operated entirely by women, cutting tubing at various angles for airplane struts. The National Supply Company selected the No. 8 MARVEL Band Sawing Machines for this work because no other equipment is available to cut these airplane struts with ease, accuracy and economy. They are also using this saw in their tool room, for no matter how small and delicate or heavy and clumsy the job, the MARVEL No. 8 Band Saw will handle it with equal ease.

For production cutting of bar stock up to 10" x 10", they are using three No. 9A MARVEL Saws; which automatically measure, cut and feed up bars up to 10" diameter into accurate, equal lengths, similar to a screw machine, without the attention of an operator.

For real big sawing work, such as shipshaft, breech blocks of guns and other heavy forgings, three No. 18 MARVEL Universal Roll Stroke Hack Saws are used. These giant saws have made possible the economy, speed and efficiency of the Hack Saw Method on cutting large work up to 18" x 18" and 24" x 24".

A "MARVEL metal cutting specialist" is available to survey your work, to recommend the best solution to your cut-off problem and to furnish accurate cost and production data on your work. All without cost or obligation, of course. Write for full information.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 W. BLOOMINGDALE AVE. CHICAGO 39, U.S.A.

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

MARVEL SAWS

ACCURACY . . . Hardinge Engineered Form Tools produce correctly . . . immediately, with a desired part finish and with more pieces per grind.

In spite of ever increasing demands for Hardinge Engineered Form Tools, you are assured of the Hardinge Special High Speed Steel, Heat Treatment, Ground Finish and Hardinge Accuracy.

Why Hardinge Form Tools are preferred:

1. Hardinge Special High Speed Steel is available only in Hardinge Form Tools.
2. Proper Hardness developed by painstaking heat treatment.
3. Excellent Ground Finish . . . for better Part Finish.
4. Absolute Accuracy.
5. Longer Life . . . Lower Part Costs.
6. Supplied for any make of machine.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR **HARDINGE** ELMIRA, N.Y.

For Hitting the "Pinpoint" from Five Miles Upstairs

Microhoning Provides Vital

High altitude bomb sights need a certain number of bearing surfaces of almost perfect precision accuracy and surface finish. The amazing accuracy of our bomb sights depends on this near-perfect accomplishment.

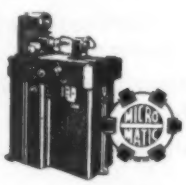
The thousands of these bomb sights needed made it necessary to achieve this fine instrument precision at production speed.

Ordinary machining practice can't produce such results—and fine instrument methods just aren't fast enough.

Microhoning bridged the gap. By means of this highly controlled abrading process, the extreme precision needed was obtained at production rates.

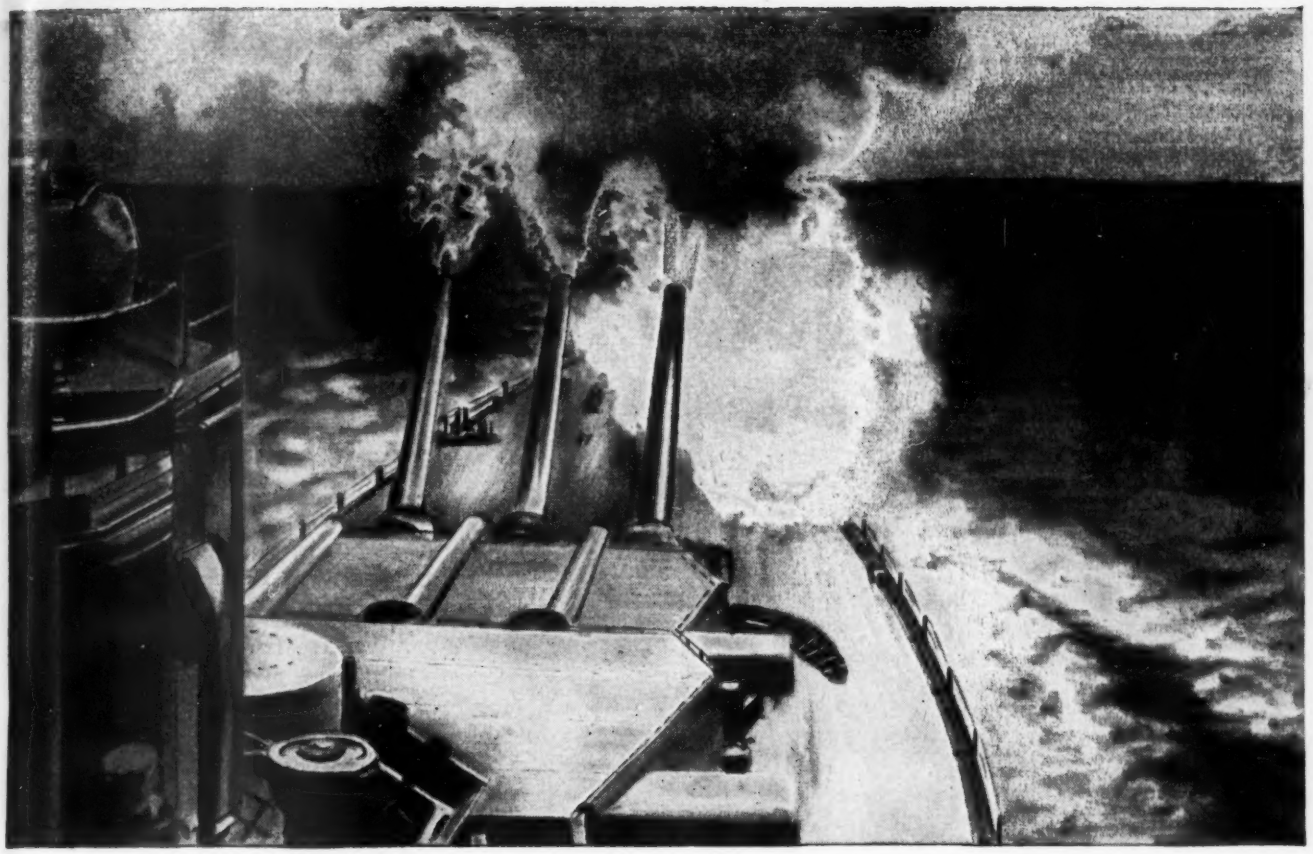
This modern final machining process will generate dimensional accuracy to "tenths" and fractions of "tenths", and provide any desired surface finish. It is applicable to the bores of these bomb sight bearings as it is to highly loaded gun turret bearings.

Precision Microfinish Honing will make many important contributions in postwar processing and Micromatic engineers will be ready with many new honing developments.



MICROMATIC
HONE CORPORATION
DETROIT 4, MICHIGAN

MAKERS OF HONING MACHINE TOOLS



. . . or Blasting a "Tin Can" Beyond The Horizon

Precision Bearings in Wartime Production

A battleship gun turret is a complex precision instrument on a gigantic scale. Each complete turret weighs about 1550 tons—as much as an entire medium weight destroyer. This great mass must not only move smoothly, but also very rapidly —guns must be quickly targeted with extreme precision and without backlash. That calls for something extraordinary in the way of bearings.

They must be dependable and have amazing accuracy. Inaccuracy or the slightest imperfection of operating fit would destroy the telescope precision needed to make each shot count.

The best ordinary machining methods won't provide the precision nor the fine surface finish necessary for accurate frictionless operation.

Microhoning was found to be the answer. Microhoning is a process of final machining which generates average bore accuracy for roundness and straightness within .0002" to .0003"—which removes up to 65 cubic inches of stock per hour. In production of turret bearings—not only for battleships, but also for cruisers and destroyers—Microhoning has provided the desired combined precision and finish.

And, it will be more constructively useful in coming times of peace than it has been in war production.

MICROMATIC

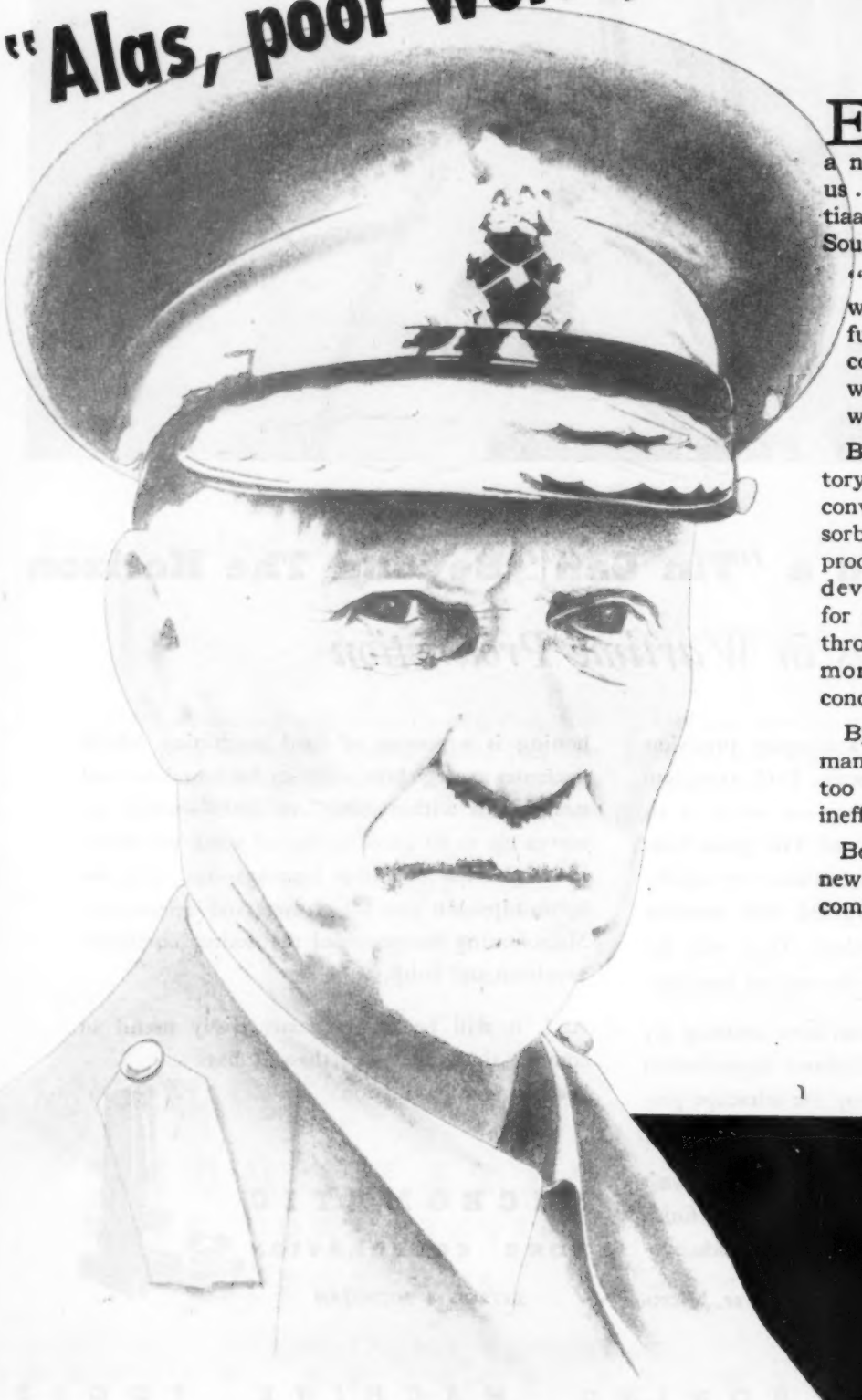
HONE CORPORATION

DETROIT 4 MICHIGAN

MAKERS OF HONING MACHINE TOOLS

then he said to himself

"Alas, poor world, I knew it well"



EXPLAINING how the old map is being rolled up and a new map is unrolling before us . . . Field Marshal Jan Christiaan Smuts, Prime Minister of South Africa, went on to warn:

"We are living in a world where we are **FORCED** to a fundamental revision of old concepts. The old world that we knew has **GONE** and it will **NOT RETURN!**"

Be thankful that to many factory men here in America that conviction has already been absorbed, because the urgency for production . . . the urgency for development...the urgency for redesign has made evident, throughout these critical supply months, the need for better concepts.

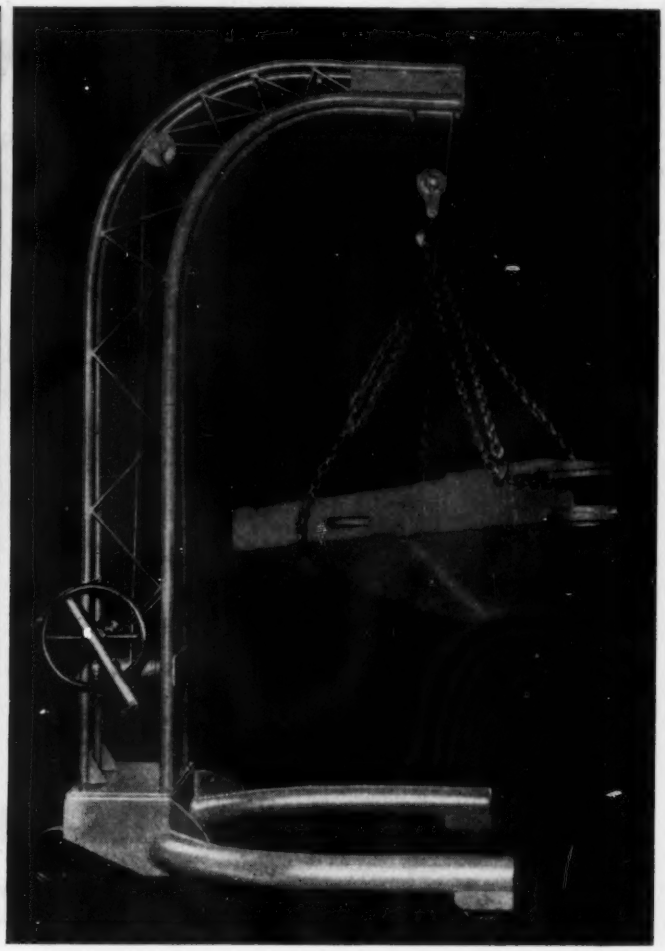
By following old concepts in manufacture, the materiel flowed too little and too late and too ineffectively.

Be thankful for the hundreds of new concepts that are now overcoming our peril. For example:

"A New Map is Unrolling," *he says*

LOOK, MARSHAL SMUTS, how fundamental thinking is revising old concepts in the design of metal products:

THE OLD MAP in the world of Canton portable cranes, manufactured by The Hill Acme Company, Cleveland, Ohio. The former, conventional design of 6000-lb. capacity weighed 2225 lbs.



THE NEW MAP . . . the result of fundamental thinking with welded design. Of the same capacity, it weighs only 1000 lbs. . . . 1225 lbs. lighter. Even a girl can pull this welded steel crane; whereas the former design required two men. A better product . . . made possible by Arc Welding.

The Lincoln Engineer nearby will gladly help you revise old concepts with Arc Welding.

THE LINCOLN ELECTRIC COMPANY, CLEVELAND 1, OHIO

America's greatest natural **recourse**

ARC WELDING

UNION

"The Tools you Buy Again"

ARE THE TOOLS THAT ASSURE BETTER, FASTER WORK AT LOWER COST

Longer lasting accuracy and greater all-round efficiency of UNION tools under stepped-up production demands are the direct result of careful selection of materials, close production control through every step in manufacture and developments in tool design which only long, specialized experience can create.

Better, faster work at lower cost should be the determining factor in selecting those small tools which play such a big part in today's production. Because such results are consistently attained with UNION TOOLS, the wisdom of specifying "UNION" is apparent.

UNION TWIST DRILL CO., Athol, MASS.

The UNION LINE
TWIST DRILLS
MILLING CUTTERS
REAMERS
HOBS
SLITTING SAWS
END MILLS
TAPS
DIES
SCREW PLATES
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STORES—New York: 61 Reade St., Chicago: 11 So. Clinton St., Detroit: 5527 Woodward Ave., San Francisco: 121 Second St., Los Angeles: 524 E. Fourth St., Seattle: 568 First Ave., South.

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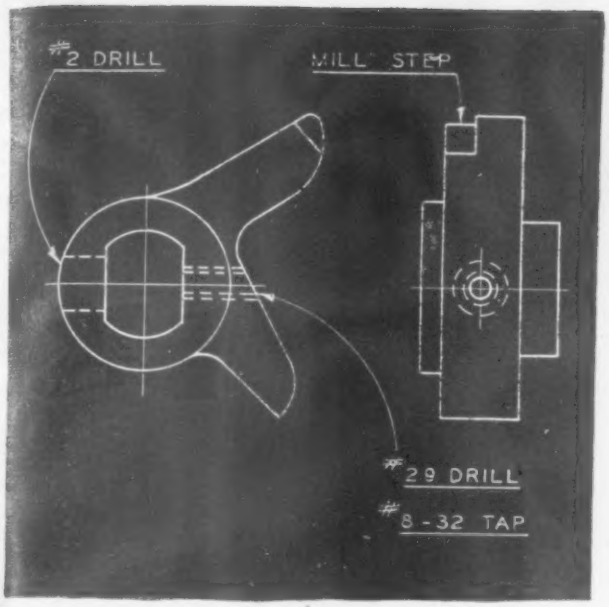
UNION



THIS IS A FLEXIMATIC AUTOMOTIVE JOB!

FLEXIMATIC

by KINGSBURY

Flexible, Automatic, and Fast . . . !

Even such a small part as an automobile door latch presents an opportunity for savings when a Kingsbury FLEXIMATIC is used to produce them. The machine illustrated performs four operations—drilling two holes, tapping and milling—finishing these brass forgings at unbelievably high speeds. And, in adding to the ease and economy of FLEXIMATIC operation is the fact that this machine doesn't even have to be unloaded! The operator merely loads the work and clamps it. It is automatically unclamped and ejected.

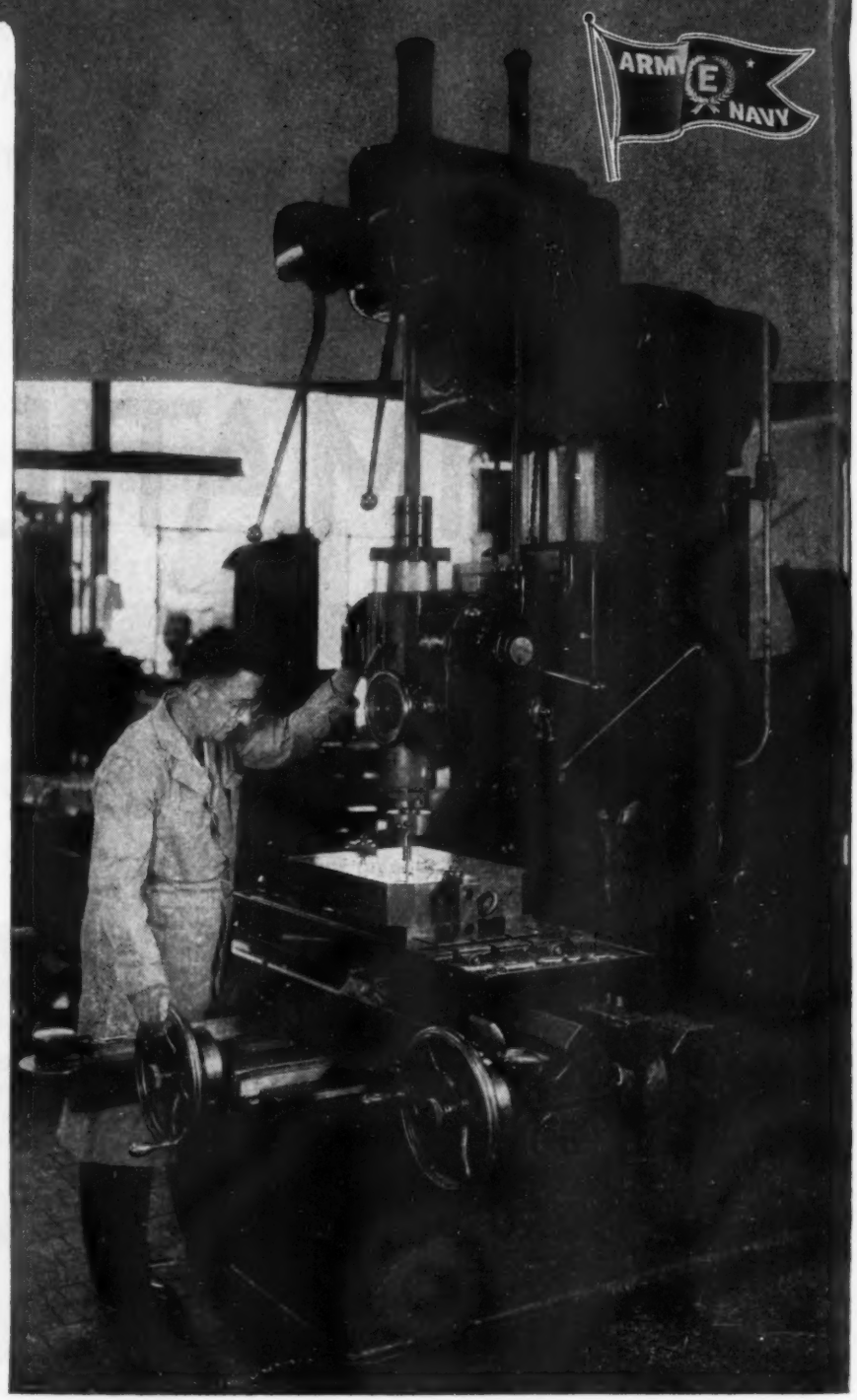
Kingsbury FLEXIMATICS are made up of standard units for drilling, milling, tapping, etc. — as many as necessary — mounted in any position on one of several types of standard bases. This Kingsbury method of standardizing the various units of assembly results in a machine that can easily be changed to meet changes in design and producion . . . a FLEXIBLE, an AUTOMATIC, a FAST production machine.

KINGSBURY MACHINE TOOL CORPORATION

KEENE NEW HAMPSHIRE U S A

Die and tool work demands accuracy of

FOSDICK JIG BORER



● On particularly close tolerance work, such as making the die illustrated, Fosdick Jig Borers are demonstrating their ability to meet the exceptional accuracy demanded in hundreds of tool rooms and tool and die shops.

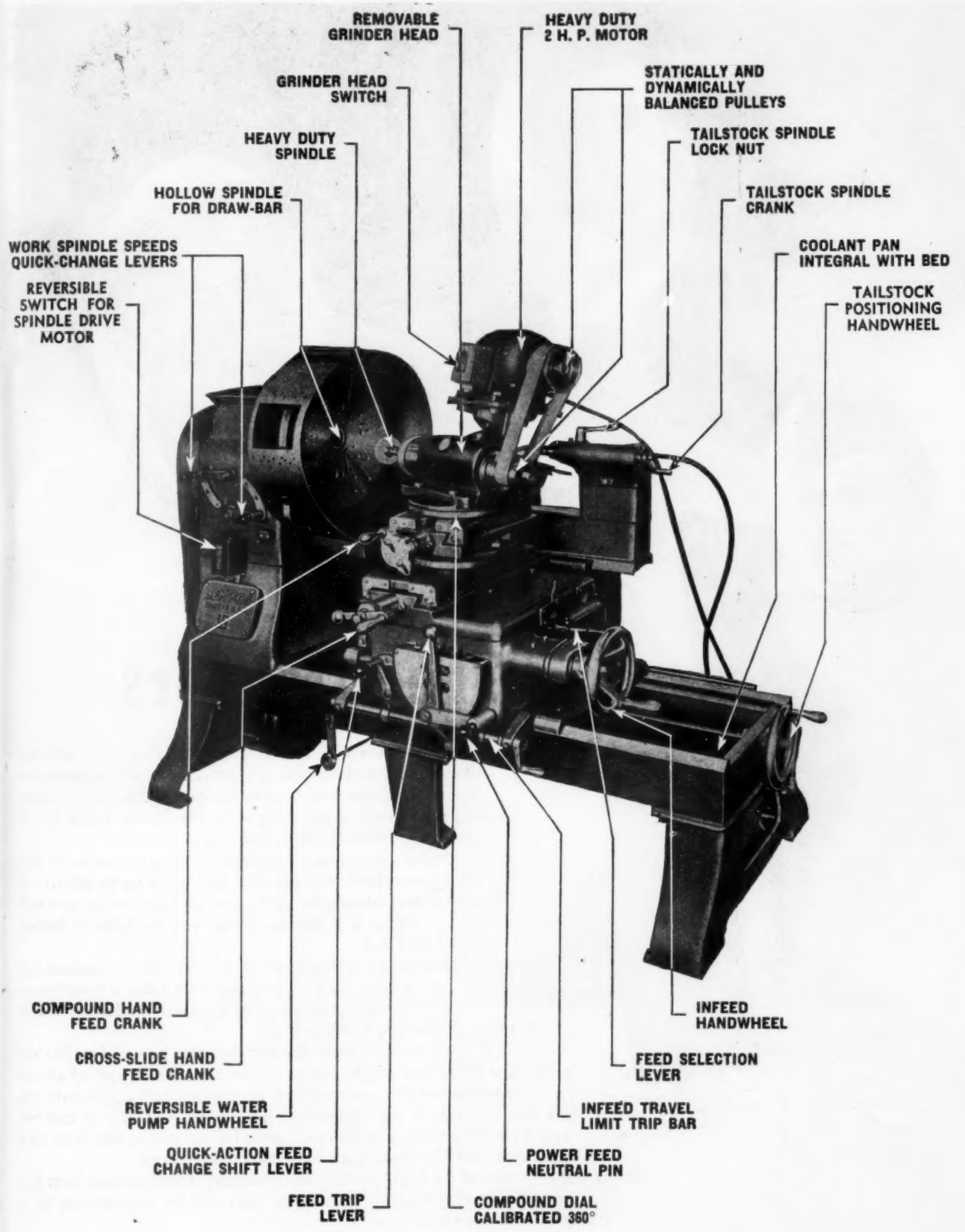
The machine is exceptionally rigid—for example the bed of rugged construction is heavily ribbed to avoid distortion. A three point bearing serves for leveling and maintains perfect alignment. A sturdy sliding head supports spindle close to the work.

Operation is also very simple. All controls are centralized for ease of control. Twelve speeds in geometrical progression from 60 to 1500 RPM are instantly obtained thru a single lever. Nine feeds from .00125 inch to .010 inch are available thru a single control lever with direct reading index.

Thus the Fosdick Jig Borer offers all the advantages of high priced precision machines at a comparatively low cost. If you have a precision drilling—boring—facing or even light milling operation—put it on a Fosdick for speed—accuracy and low cost.

A full descriptive bulletin is available—ask for Fosdick Jig Borer Bulletin J.B.A.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, ··· OHIO


REMOVABLE GRINDER HEAD
HEAVY DUTY 2 H. P. MOTOR
GRINDER HEAD SWITCH
STATICALLY AND DYNAMICALLY BALANCED PULLEYS
HEAVY DUTY SPINDLE
TAILSTOCK SPINDLE LOCK NUT
HOLLOW SPINDLE FOR DRAW-BAR
TAILSTOCK SPINDLE CRANK
WORK SPINDLE SPEEDS QUICK-CHANGE LEVERS
COOLANT PAN INTEGRAL WITH BED
REVERSIBLE SWITCH FOR SPINDLE DRIVE MOTOR
TAILSTOCK POSITIONING HANDWHEEL
COMPOUND HAND FEED CRANK
INFEED HANDWHEEL
CROSS-SLIDE HAND FEED CRANK
FEED SELECTION LEVER
REVERSIBLE WATER PUMP HANDWHEEL
INFEED TRAVEL LIMIT TRIP BAR
QUICK-ACTION FEED CHANGE SHIFT LEVER
POWER FEED NEUTRAL PIN
FEED TRIP LEVER
COMPOUND DIAL CALIBRATED 360°

MODEL HGX GRINDER This heavy-duty universal grinder turns and grinds, internal, external, face, and taper jobs. Big 53" swing. Matched preloaded pairs of balanced precision ball bearings used in each end of the heavy-duty spindle. Four quick selective work spindle speeds. Three each quick-change table and cross-feeds, automatic in both directions. Good delivery. Ceiling-priced. Write for full details today.

LEMPCO

5711 DUNHAM ROAD
BEDFORD ■ OHIO

The Strangers

It happened in France the other day. One of the bitterest ironies of our age of war . . . An American soldier—whose father had died in Flanders' fields without ever having seen his infant son — gave his life for the future of an infant son he in turn had never seen.

Three generations of strangers . . . and now what of the third generation? Will this child, too, grow up to inherit all the old lies, the mistakes, the weaknesses that go to make up war? What is it that his father and his father's father died for?

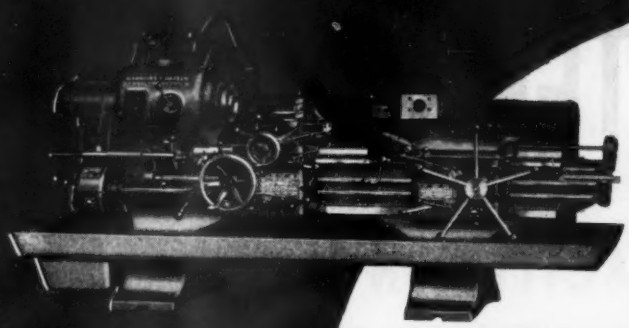
Already, we're dusting off the solemn aphorisms about not having died in vain, and we'll build a bright new marble cenotaph to his unknown father. But it isn't enough. Brother, it isn't enough!

We will emerge from this war the most powerful nation on earth. Our Navy and our Air Forces will be twice the size of all others combined — our manufacturing productivity will equal half the world's total capacity. If we can't enforce peace with that kind of club — and if we can't make jobs building houses for our sons to live in as well as by building tanks for them to die in — then God help us!

Today, the engineers of the basic machine tool producers stand ready to help the men of government and of industry to plan *now* for reconversion to a strong and prosperous America.

One of these is a Bryant man. We urge you to call him in today, for time is running out!

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.



HYDRAULIC COLLET CHUCK AND BAR FEED

Step Up Production

Easy and natural movements of the convenient control lever, in the operator's left-hand, opens the collet, feeds and grips the bar for the next cut. The work is done by a hydraulically actuated mechanism driven by a pump in the head.

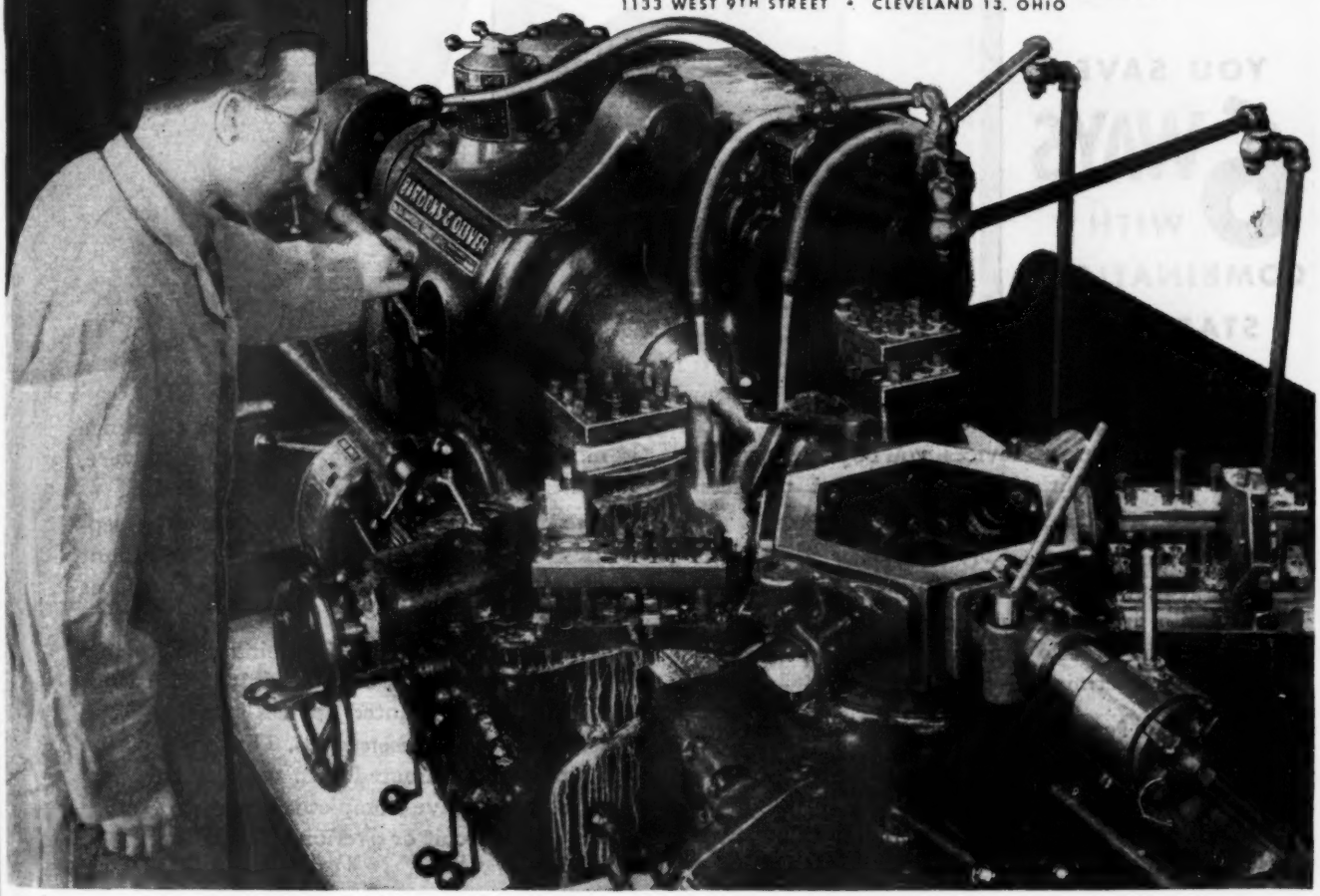
It means more parts produced at the end of the shift. Yet, the operator feels far less fatigued from his day's work.

This is another new and exclusive feature of the BARDONS & OLIVER NO. 21 SADDLE TYPE UNIVERSAL TURRET LATHE.

Write for catalog today.

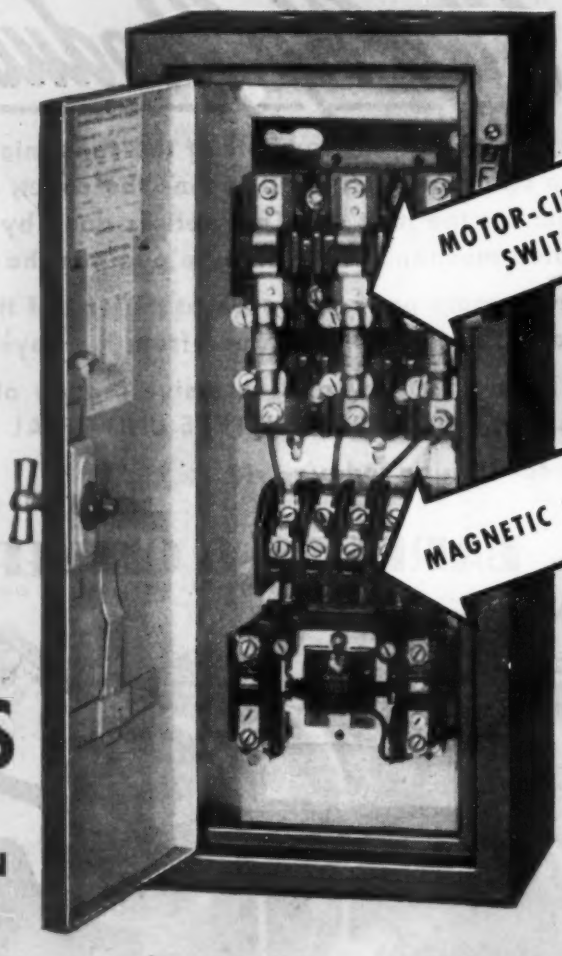
BARDONS & OLIVER, INC.

1133 WEST 9TH STREET • CLEVELAND 13, OHIO



MOTOR STARTERS EVERY TYPE,

DEPENDABLE . . . ATTRACTIVE IN APPEARANCE



For full-voltage starting of squirrel-cage a-c motors

BOTH IN ONE UNIT

YOU SAVE 6 WAYS WITH COMBINATION STARTERS

1. Save Ordering Time—Instead of buying two separately mounted devices, you buy one factory co-ordinated unit that controls and protects your motor.

2. Save Installation Time—Users report a 50 per-cent reduction in mounting time, a 40 per-cent reduction in wiring time, as compared with the installation of two separate devices. You connect only 9 terminals—not 15.

3. Save Man Power—By eliminating one complete mounting job on every installation, you save valuable man power.

4. Save Money—Cost slightly more than two separately mounted devices, but the difference is more than made up by the savings in wire, conduit, fittings, and installation-labor costs.

5. Save Wall Space—Take up less space than separately mounted devices. You can mount combination starters in small, unused spaces near the operators.

6. Save Critical Materials—Combination starters have less copper wire, steel conduit, and fittings than separately mounted devices

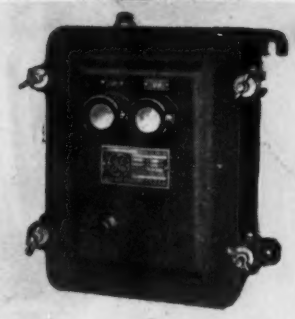
—and they save your motors, too. The fuses, or the breaker, are co-ordinated with the thermal overload relays to give complete motor protection under short-circuit or overload conditions.

EVERY KIND, FOR EVERY MACHINE APPLICATION

DESIGNED TO BLEND WITH MODERN MACHINES

Magnetic Full-voltage Starter—Designed to provide long life, ease of installation, readily accessible parts for quick inspection, and the dependability requisite to modern industrial needs.

Magnetic Full-voltage Starter—Showing Selector switch mounted in the cover of a general-purpose case.

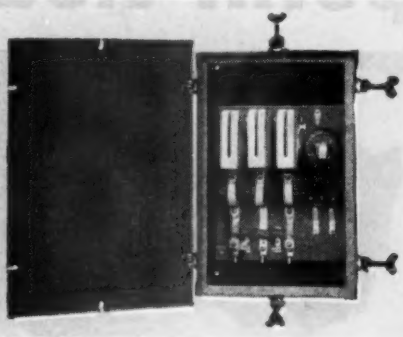


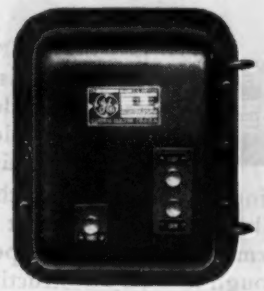
A-c Magnetic Starter with Watertight Case—Wall-mounted, overload-relay reset button in cover, and push button can be added.

Starter with Dust-tight Case—Fabricated, case of cold-rolled sheet steel—wall-mounted—overload-relay reset button in cover.

Oil-immersed General-purpose Starter—Suitable for use in corrosive atmospheres found in such places as chemical plants and oil refineries, or for outdoor use.

Starter for Hazardous Locations—Will withstand internal explosion—high tensile cast iron will meet hydrostatic pressure test—overload-relay reset button in cover.





NAME YOUR APPLICATION

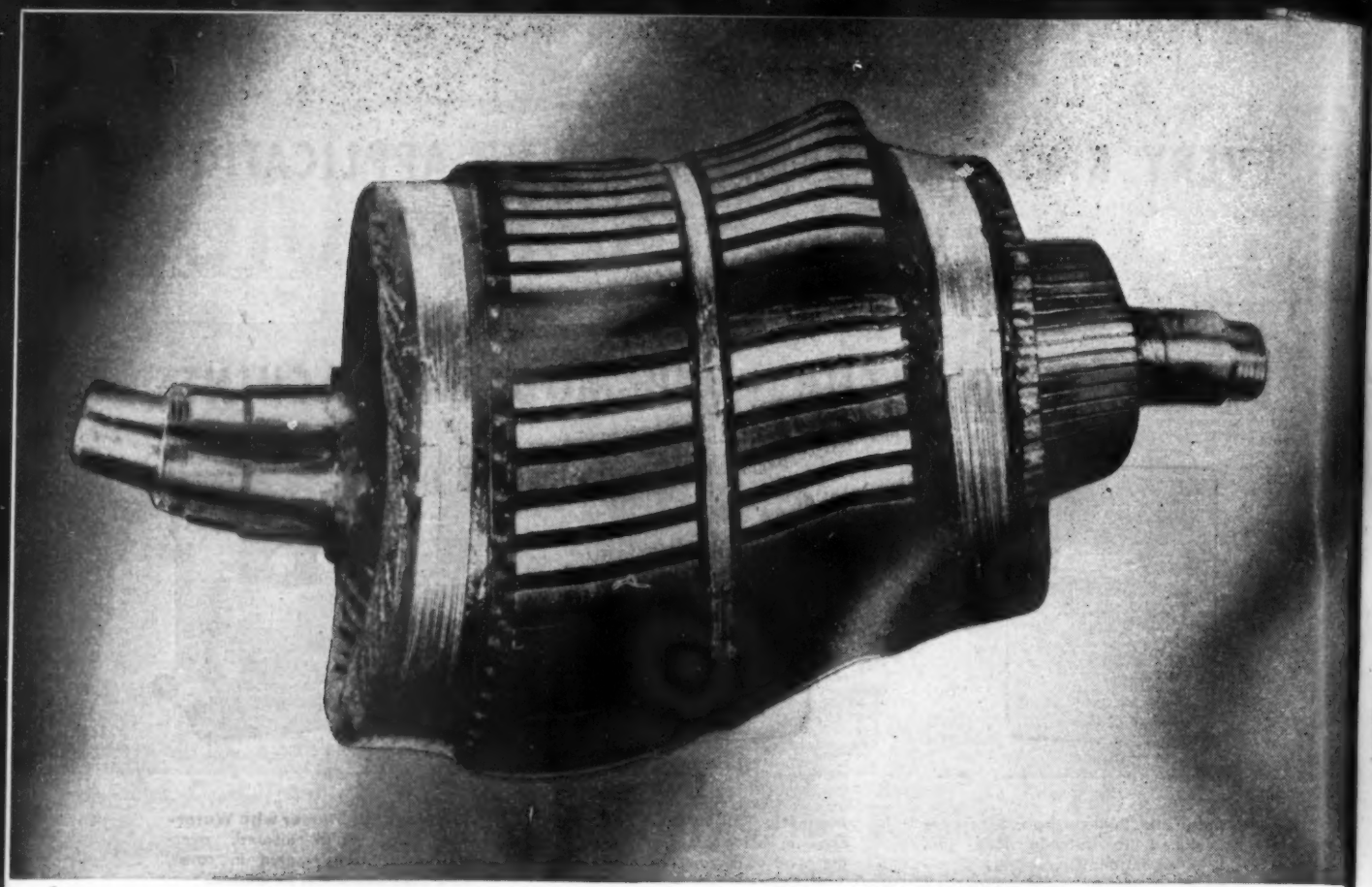
G-E starters come in a variety of enclosures to meet any operating condition, and are available for motors from 1 to 1000 horsepower. Write today for further information about these starters—our engineers will be glad to help you select the correct type for your needs. *General Electric Company, Schenectady 5, N. Y.*

INDUSTRIAL CONTROL

GENERAL ELECTRIC

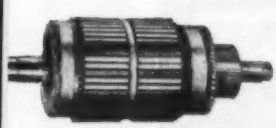
4176-131-M920

BUY WAR BONDS



DONE WITH MIRRORS...

to make this point clear



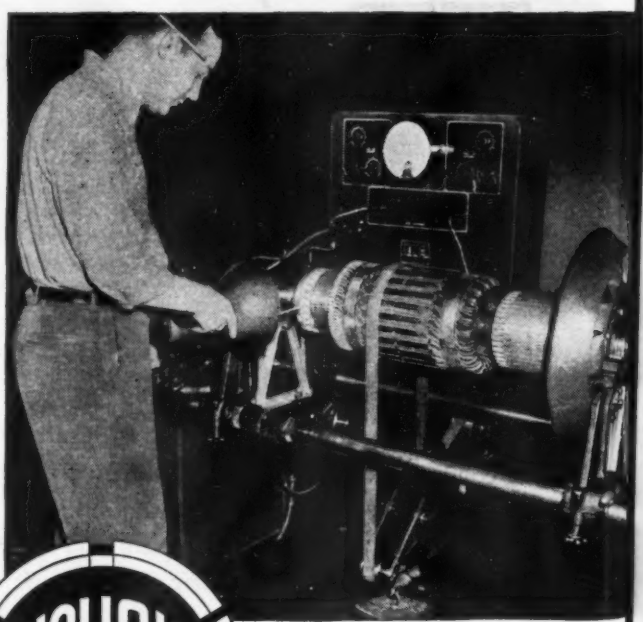
A DISTORTION MIRROR produced this queer-looking armature. It wouldn't work—that's obvious. It wouldn't even turn in any self-respecting motor.

But the point to remember is this: any rotating part not properly balanced can be almost as unfit for service as this grotesque armature. Unbalance, perhaps just a fraction of an ounce, is enough to set up destructive vibrations once rotation starts.

Vibration can be eliminated—quickly and at low cost—with Gisholt Dynetric Balancing Machines*. By means of electronics, they catch the unbalance vibrations in *any* rotating part, be it one ounce or 50 tons. Even a movement of .000025" won't escape these highly sensitive machines . . . in a matter of seconds, it's *located, measured* and *ready for correction.*

Remember, a slight unbalance may exist in the most carefully made assembly. You can't see it—but you can feel it when the piece is rotating, and it will endanger the reputation of your product. Why take chances? Investigate the Gisholt Balancing Machine today!

A development of Westinghouse Research Laboratories



GISHOLT MACHINE COMPANY

201 East Washington Ave. • Madison 3, Wisconsin

Look Ahead . . . Keep Ahead . . . With
Gisholt Improvements in Metal Turning

GISHOLT

DYNETRIC BALANCING MACHINES *assure the accurate static and dynamic balance without which your product will not operate with maximum efficiency. Write for free and complete information.*

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

OUTSTANDING PERFORMANCE

BARBER-COLMAN

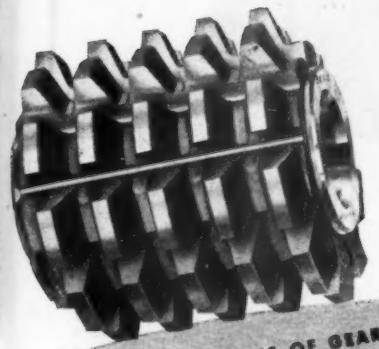
HOBS • HOBBING MACHINES • HOB SHARPENING MACHINES • MILLING CUTTERS
REAMERS • REAMER SHARPENING MACHINES • SPECIAL TOOLS

HOBS

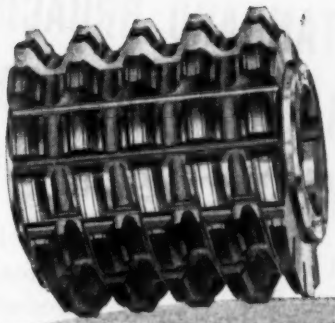
Illustrated here are a few examples of the various types of Hobs manufactured by Barber - Colman Company, together with brief indications of the outstanding performance they can deliver. Additional information will be supplied upon request.

A distinctive feature of all B-C Hobs is Specialized Engineering which provides careful control of proper tooth form, material, heat treatment, tolerances, and finish to assure maximum precision and performance. Because of our broad engineering experience in analyzing many special applications, B-C Hobs have been the answer to many difficult hobbing problems.

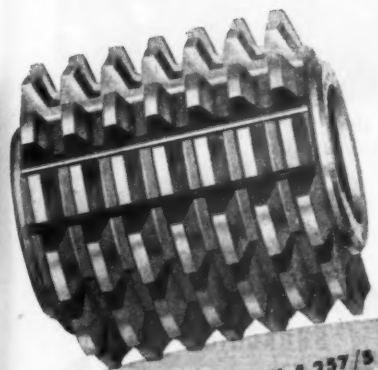
Why not bring your 1945 Cutting Tool Files up to date by writing today for a copy of our complete Hob Catalog.



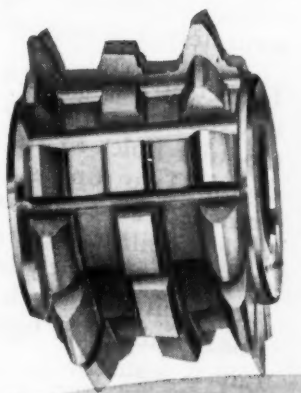
"9,120 LINEAL INCHES OF GEAR TOOTH PER HOB SHARPENING IN HEAT TREATED HY-TEN 84 STEEL, 50-53 SCLEROSCOPE."



"16,593 LINEAL INCHES OF SPLINE PER HOB IN HEAT TREATED 1045 STEEL, 269-321 BRINELL."



"AXLE PINIONS, 16 TEETH 4.257/8 PITCH 1⅝" FACE, HOBBED IN 4820 STEEL, 132 PIECES PER GRIND."



"2,274 INCHES PER HOB SHARPENING OF ACCURATE DEEP KEY SLOTS WITH PARALLEL SIDES AND SHARP CORNERS."

"1260 INCHES OF TAPER SPLINE HOBBED IN HEAT TREATED NE8720 STEEL 38-43 ROCKWELL, 120 PIECES PER GRIND."

Accurate! *Dependable!*

Barber-Colman Company

GENERAL OFFICES AND PLANT 111 LOOMIS ST., ROCKFORD, ILLINOIS

THE EVENING NEWS

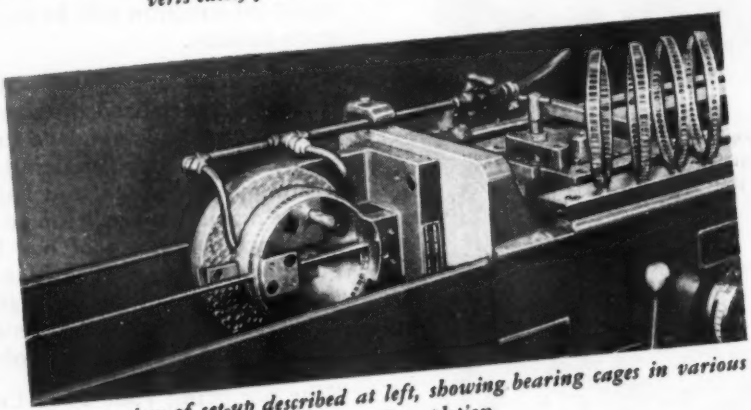
FINAL

RECONVERSION PROBLEM SOLVED!

American H-2-30 STANDARD BROACHING MACHINE ADAPTED TO MANY "SPECIAL" JOBS!

ABOVE: *Standard American H-2-30 Horizontal Broaching Machine reconverts easily from war to post-war production.*

This standard *American* broaching machine, designed for use in many types of war production, is cheaply and quickly converted to peacetime manufacture. Considerably less expensive than especially built equipment, it will perform a large number of "special" jobs accurately and economically.



Close-up view of set-up described at left, showing bearing cages in various stages of completion.

The set-up for one such job is illustrated at the right: To broach rectangular holes in aircraft bearing cages. Two opposite holes are broached at each pass. Starting with a drilled hole, three passes, each with a slightly larger broach, are required for each hole. Exceptional finish at a high production rate is assured.

American's complete broaching service—machines, tools, and engineering—is available to speed your production. Let *American* engineers help solve your precision manufacturing problems with standard machinery that will save you valuable time and money. Write for further details.

Use proper and sufficient lubrication when broaching. It is cheap life insurance for broaching tools.

MEMBER BROACHING TOOL INSTITUTE

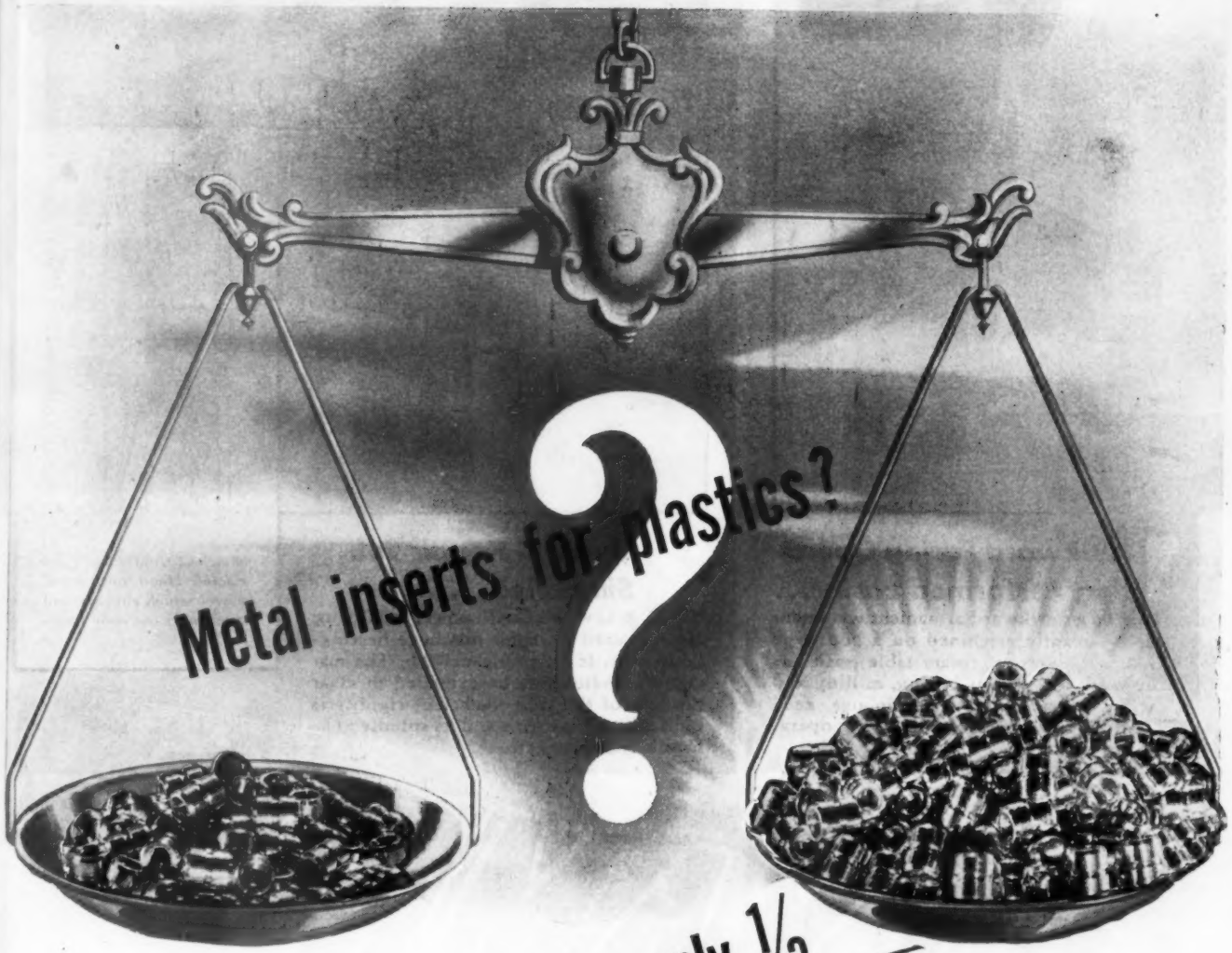
American BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF ... MACHINE CO.



In Aluminum, they weigh only 1/3—

You counted on saving weight when you decided to use a plastic. Then why use heavy metal inserts? Aluminum weighs only one-third as much, piece for piece, so it enables you to save weight there, too.

Three times as many pieces per pound often means a considerable dollar saving on these inserts.

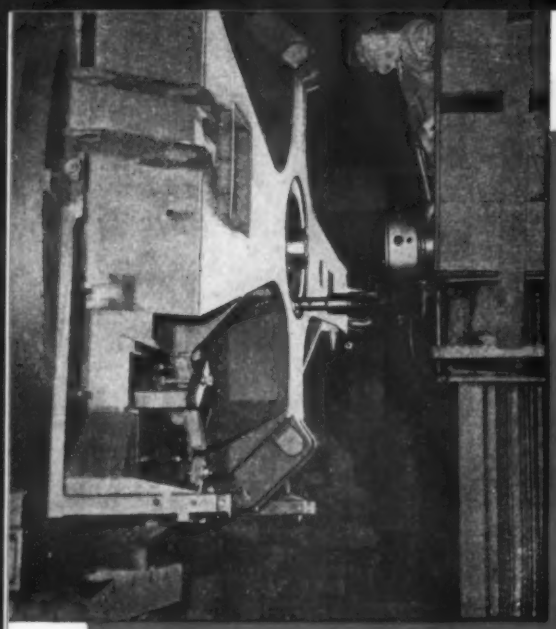
The light color of aluminum is frequently very desirable from an appearance standpoint. Inserts in transparent plastic are less conspicuous when they're made of aluminum. Metal surfaces to be exposed can be given many attractive finishes, including colors, adding greatly to the appearance of the parts.

Alcoa will gladly quote on your aluminum inserts, or on the Alcoa Aluminum stock for fabricating them in your own plant. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Pennsylvania.

FIRST IN

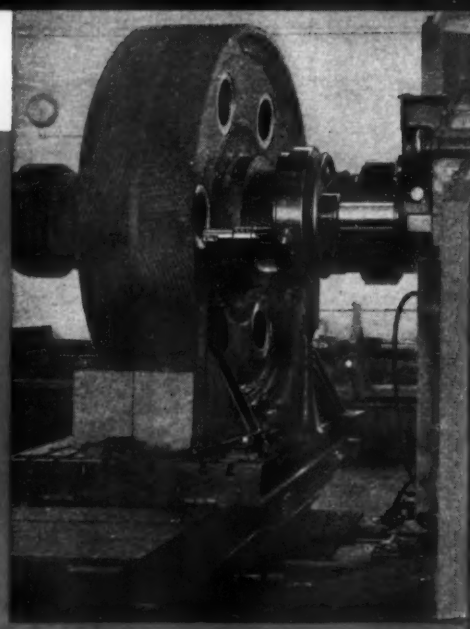
ALCOA ALUMINUM

ALCOA



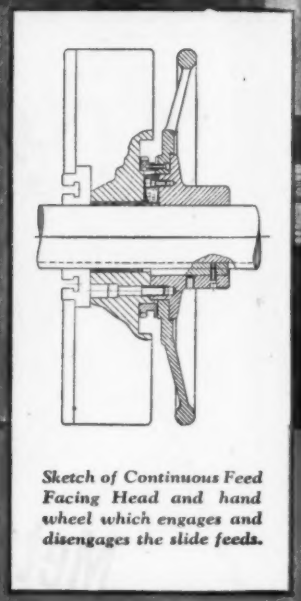
1 Awkward Facing Operation Performed Easily...

This large awkward armament weldment can be readily machined on a floor-type G. & L. A vertical rotary table positions the work for various boring, milling and facing operations. A Continuous Feed Facing Head is used for the facing operation shown.



2 Unusual Repair Job Simplified...

The G. & L. with a Continuous Feed Facing Head is used to repair this huge herringbone gear. It is an unusual job. The machine spindle must be extended to clear the hub of the gear. Sufficient rigidity is built into the machine and its spindle to handle such jobs as these.



Sketch of Continuous Feed Facing Head and hand wheel which engages and disengages the slide feeds.

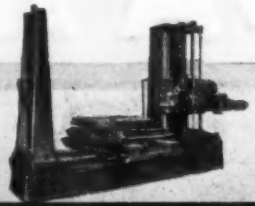
6 EXAMPLES showing how G&L handles unusual jobs

Versatility of Horizontal Boring Machine with Continuous Feed Facing Head Simplifies Boring, Turning and Facing Operations on Irregular Shaped Work...

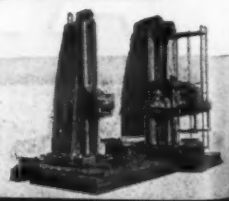
Those individual or unusual jobs whose size and shape make them unwieldy to handle can be profitably machined on a G. & L. Horizontal equipped with a Continuous Feed Facing Head. These six jobs were selected at random to show the wide range of work which can be economically produced on standard machines. In studying these machining problems which others have solved with a G. & L., you may find a better and less expensive method for doing your own work.

GIDDINGS & LEWIS
138 DOTY STREET

Right: G. & L. Table Type Machine.

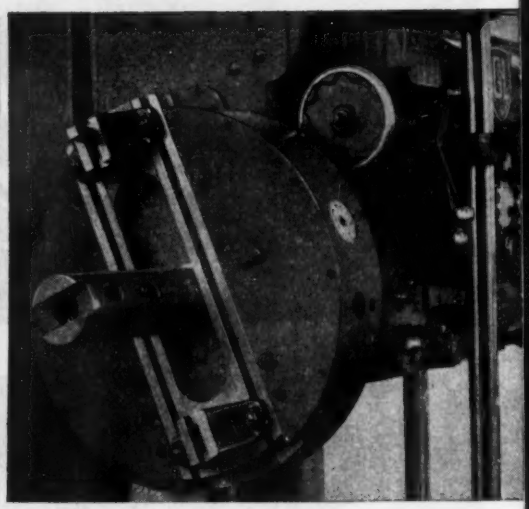


Right: G. & L. Floor Type Machine.



3 G. & L. Performs Turning Operation

This unusual turning job would be extremely difficult to handle on a vertical mill or lathe. Yet a G. & L. Horizontal Boring Machine with a Continuous Feed Facing Head and telescopic tool holder simplifies the turning and flange facing operations on this trunnion. Finish limits of .0005" were maintained. Ordinarily this type work would be rotated to turn the trunnion, but using a horizontal machine the work remains stationary and the cutting tool turns.



4 Horizontal Maintains Close Limits

Small work as well as large can be handled quickly and easily on the G. & L. Horizontal. Here is a housing being machined to "tenths." Work is mounted on a precision rotary table and indexed 180° to machine each end. The Continuous Feed Facing Head is adjusted to correct hole size and saddle feed is engaged for boring.

5 Attachment Makes Intricate Operations Possible

Numerous internal as well as external boring, facing and counterboring operations on this intricate valve body are easier to do on a G. & L. using a Continuous Feed Facing Head. The design and construction of this attachment makes possible many operations not ordinarily performed on a Horizontal Boring Machine.

6 Continuous Feed Facing Head Cuts Machining Time

The G. & L. Continuous Feed Facing Head cuts machining time 50% on this job. Formerly the locomotive axle housing required 60 hours to bore—it now requires 30. A wide range of production and maintenance work can be performed in less time on the G. & L.

Profitable Machining Possibilities Open to You...

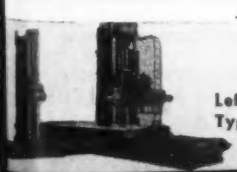
Do not overlook the profitable machining possibilities of your G. & L. Horizontal Boring, Drilling and Milling Machine, especially when it is equipped with the time-saving Continuous Feed Facing Head. Using this attachment it is possible to do many boring, turning, facing, recessing and threading operations which could not be done on other equipment. Giddings & Lewis engineers will show you how you can handle more jobs on your Horizontal Boring Machine. They will gladly help with your present and future machining problems and recommend the correct machine for your needs. There's no obligation for this engineering service.

Additional Data

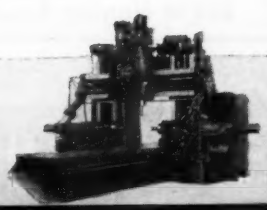
...covering the complete line of Giddings & Lewis machines and time-saving accessories is included in this catalog. Write for your free copy today—please indicate your business connection. Ask for Bulletin AM-15.

MACHINE TOOL CO.

FOND DU LAC, WIS.



Left: G. & L. Planer Type Machine.



Left: G. & L. Multiple Head Type Machine.

THE TREND IS TO *Stellite* THREAD PLUG GAGES

5 TO 20 TIMES LONGER WEAR

ALL STANDARD SIZES

from

Number 5 (.125") to 1.5"

Specials to 15"

•

CADILLAC *Thread* **GAGES**

THE increasingly large percentage of orders which we are daily receiving for thread plug gages made of Stellite indicates a marked preference for this longer-lasting alloy by those who use gages for the inspection of mass production parts.

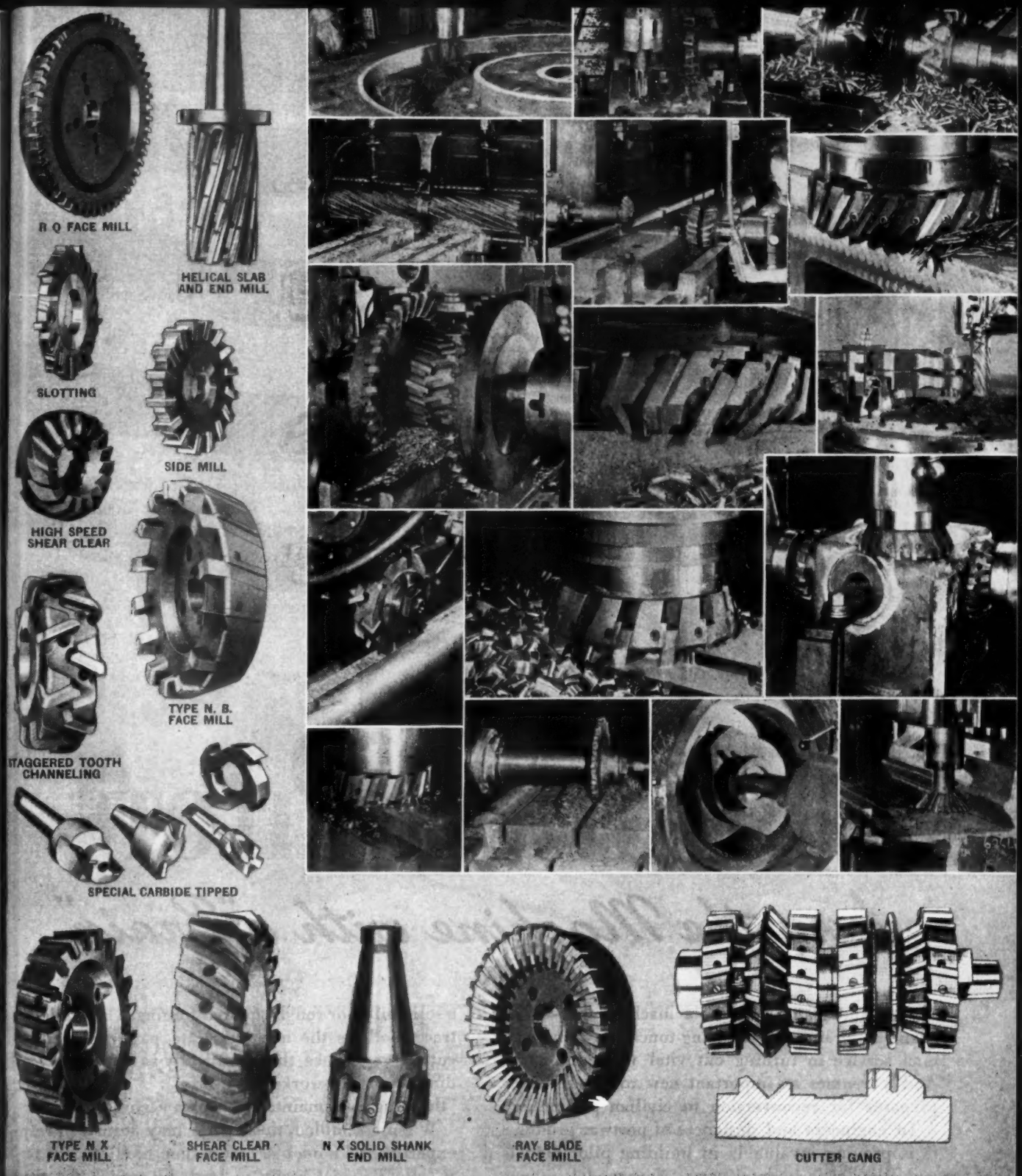
Because of its demonstrated ability to give 5 to 20 times the wear of the best steel gages, many plants are now in process of changing over to the use of Stellite gages exclusively.

If you have a job that is tough on gages, give Cadillac STELLITE Gages a try! Keep tab on their length of service, as compared with the best results you have ever obtained with steel gages, and you will have definite proof that on quality inspection jobs Stellite gages will reduce your gaging costs to a fraction of what they have been heretofore.

Write for Literature

CADILLAC GAGE COMPANY

20316 Hoover Road **Detroit 5, Mich.**

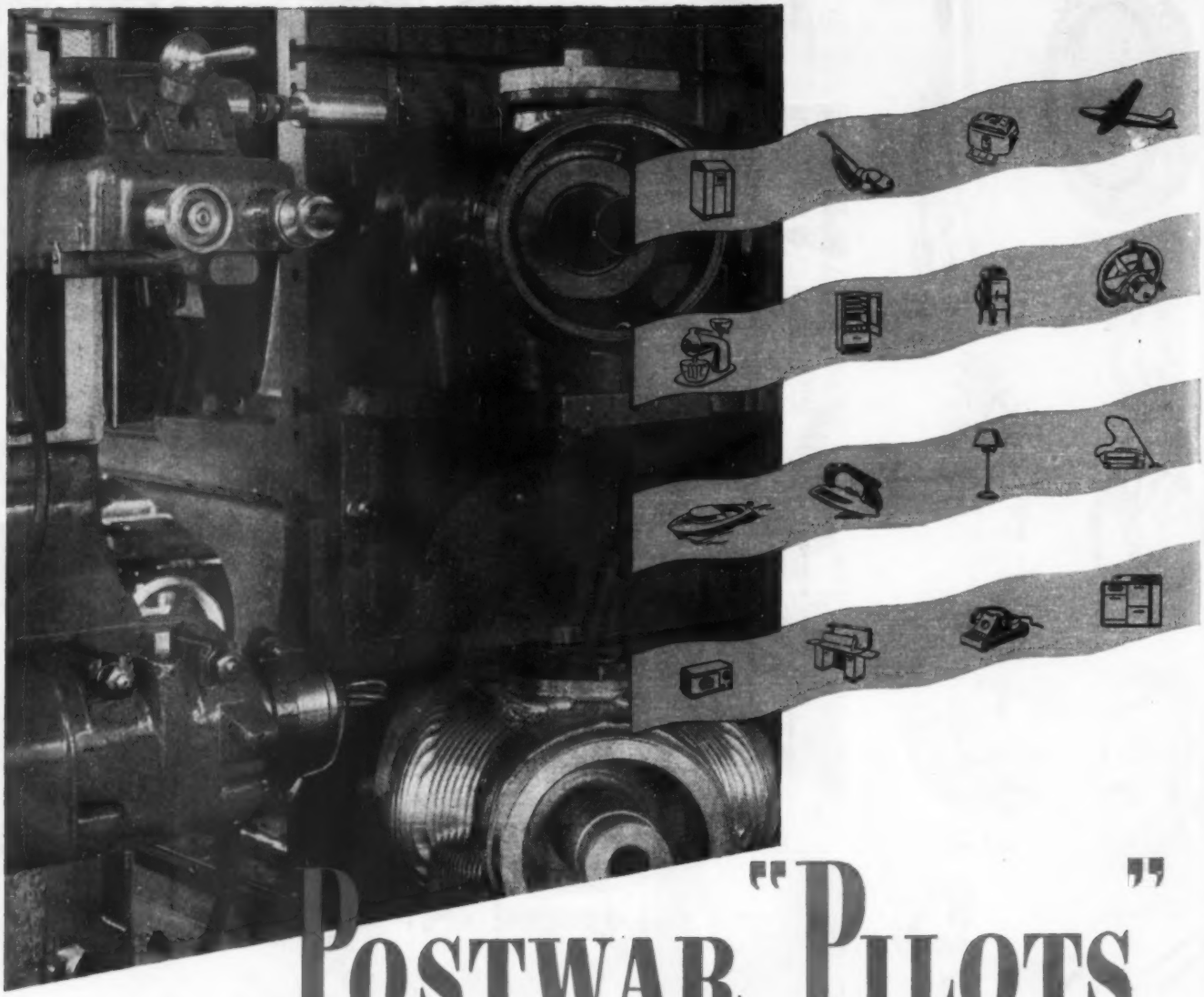


Present Ingersoll cutter designs have developed from over fifty years' experience in making tools for special Ingersoll milling, boring, and drilling machines. In addition to the standard types of inserted blade milling cutters for face milling, side milling, slotting slabbing and end milling, many special types of tools are available. Both types are illustrated above by themselves and at work.

Most of these tools may be furnished with either high speed steel, cast alloy, or carbide tipped blades. We also build solid cutters with brazed carbide tips and negative angle carbide cutters for milling steel.

We will be glad to send you a booklet (Ingersoll Milling Cutter Engineering Specification Sheets) describing our standard inserted blade cutters. Your inquiries concerning special inserted blade tools will also receive prompt attention.

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILL.



POSTWAR "PILOTS"

from the Machine with a "Brain"

This is the giant Keller — a machine whose mechanical "brain" and unerring touch are doing yeoman service in turning out vital war equipment. And it assumes an important new role as industry prepares for reconversion to civilian production.

To engineers and designers of postwar products it is proving invaluable in building pilot models and other experimental parts. New models — new inventions — can be developed for testing without expensive tooling and delay, without costly dies.

A wooden or plaster model or a plain template can be used to generate a model component out of a solid billet or rough squared forging. The Keller's tracer follows the most intricate pattern . . . its cutters reproduce this identically in two or three dimensions. It works by itself . . . does its own "thinking" . . . maintains its own accuracy.

When assembled, these parts may form a purely experimental model . . . more than likely it will be a "pilot" model ready to lead the way down the production assembly line. The Pratt & Whitney Keller is one more example of a machine that needs no conversion . . . that gives *basic accuracy for mass production* day in and day out, war or peace.

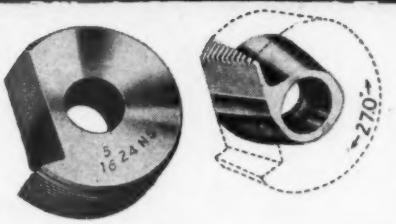
PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1 • CONNECTICUT

THE SHORT-CUT SYSTEM of Low Cost Precision Threading

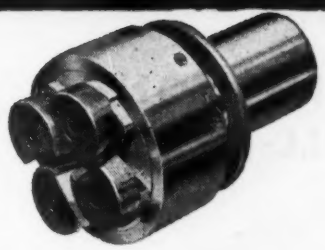
1.



NAMCO CIRCULAR CHASERS

Chasers having ground-thread annular grooves, like forming tools, with holding blocks ground to the helix angle required—this is the *modern* thread cutter, for sustained accuracy at high speed.

2.



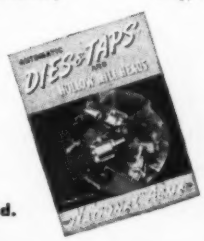
NAMCO SELF-OPENING DIEHEAD

Made to operate with circular chasers. Simple in construction, with few moving parts. Chasers always in correct adjustment save time and simplify setup. Both stationary and rotating types available.

3.

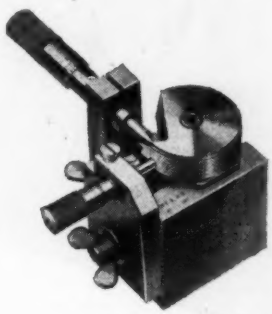
TOOL AND CHASER GRINDER

Equipped with grinding fixture and standard adapters for quick regrinding of circular chasers, but equally suited for other small tool grinding. Bench type may be supplied with base for floor mounting.



Catalog D-42-B gives complete details. Request your copy on company letterhead.

4.



MICROMETER GAGE

Quick and accurate check of chaser cutting edge, before and after grinding. With this gage, extra sets of chasers can be ground and set in the toolroom, ready to install in the head without further adjustment. No variation in precision, no time loss from trial cuts.

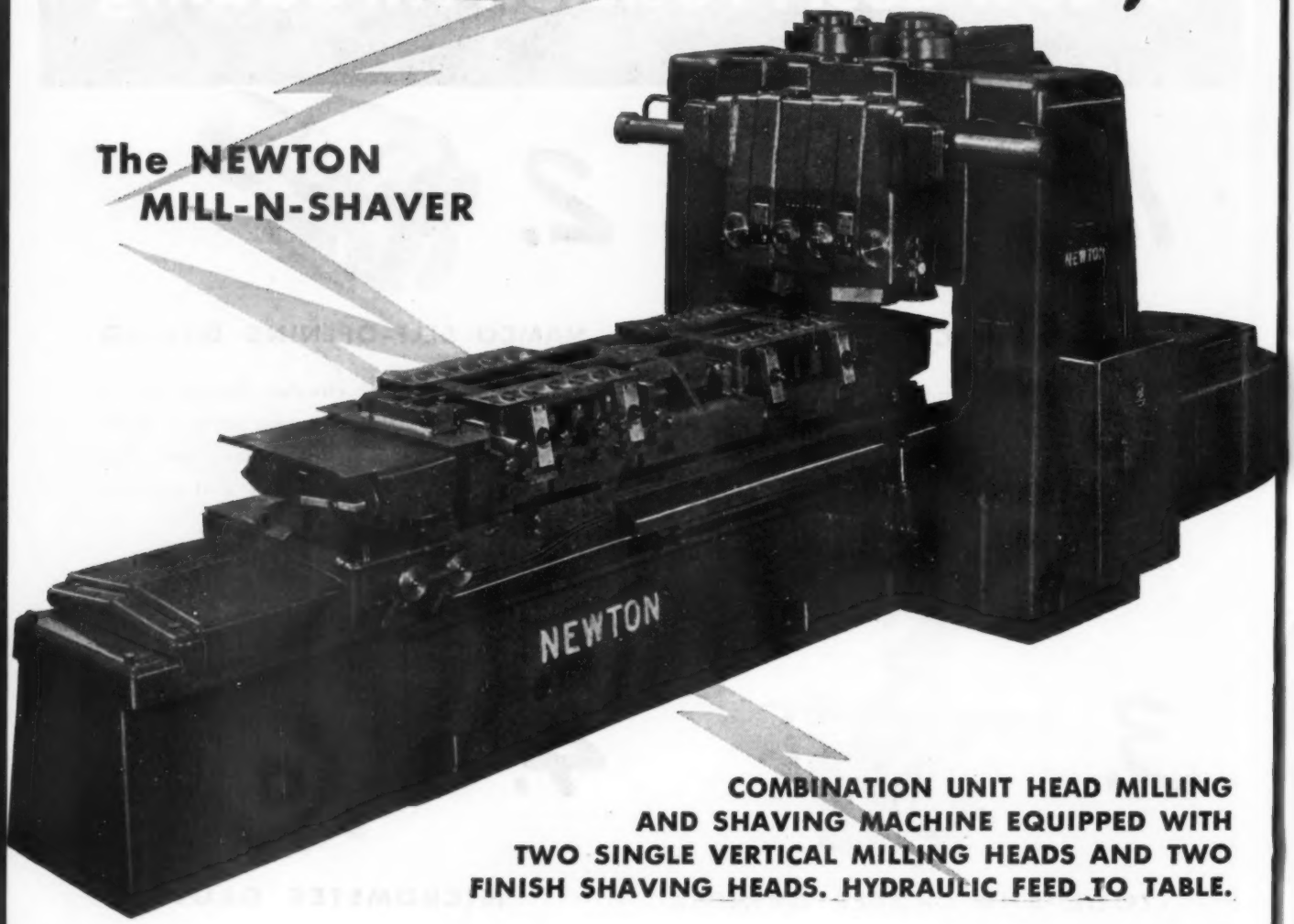
THE NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS
THE CHRONOLOG • LIMIT, MOTOR STARTER AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

TWO SEPARATE OPERATIONS.....
IN THE TIME REQUIRED FOR ROUGH MILLING —*ALONE*!

The NEWTON MILL-N-SHAVER



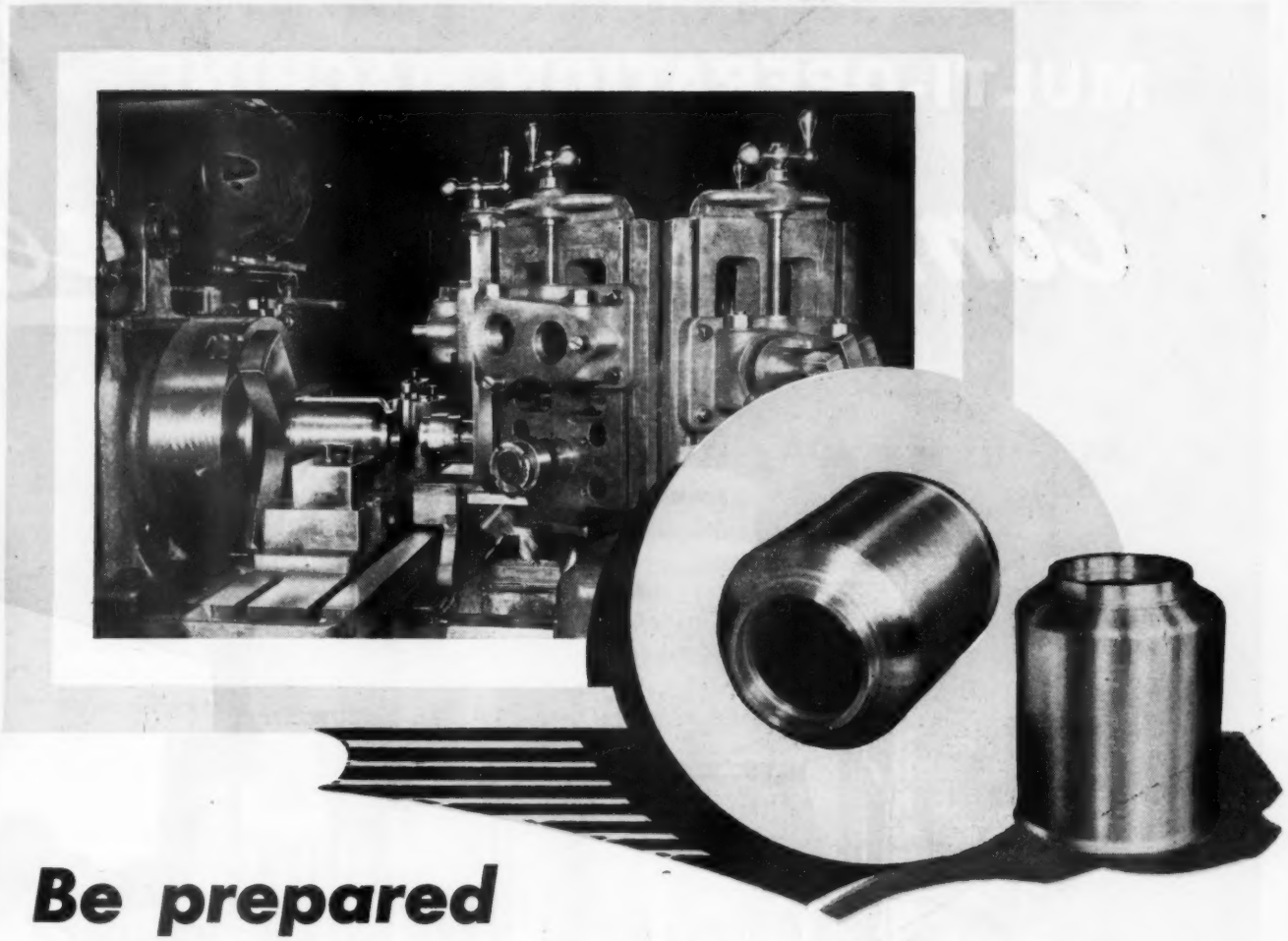
COMBINATION UNIT HEAD MILLING AND SHAVING MACHINE EQUIPPED WITH TWO SINGLE VERTICAL MILLING HEADS AND TWO FINISH SHAVING HEADS. HYDRAULIC FEED TO TABLE.

The Newton Mill-N-Shaver performs two complete operations at one pass of the table. It rough mills at milling speed and finish shaves on the return, at the rapid traverse speed. This machine produces a perfect gasket surface . . . two separate operations . . . in exactly the time ordinarily required for rough milling alone. The Newton Mill-N-Shaver is designed to both step-up your production and reduce your costs on the types of work for which this machine is adapted. For detailed information, write for Bulletin No. 580.

BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION
ROCHESTER 10, NEW YORK



Be prepared for Peace... BY RE-TOOLING YOUR P & J AUTOMATICS—NOW!

YOU SPECIFY THE PART — P & J WILL DESIGN THE SET-UP

You can keep your present P & J machines right on the job when peace comes and get many more years of useful, profitable service from them by having them changed over for other work.

Shown here is a P & J Type 5DLX Automatic Chucking and Turning Machine handling fast, accurate machining operations on cylinders. The tooling for this job can be readily changed over for low cost production of other parts without sacrificing the speed, convenience and record-making productive performance inherent in all P & J equipment.

P & J Re-tooling offers users of P & J equipment the means of making the changeover quickly so that machines will be back on the production line in shortest possible time. It will be to your advantage to consult our engineers immediately on your reconversion problems.

THE POTTER & JOHNSTON MACHINE CO.
Pawtucket, R. I.

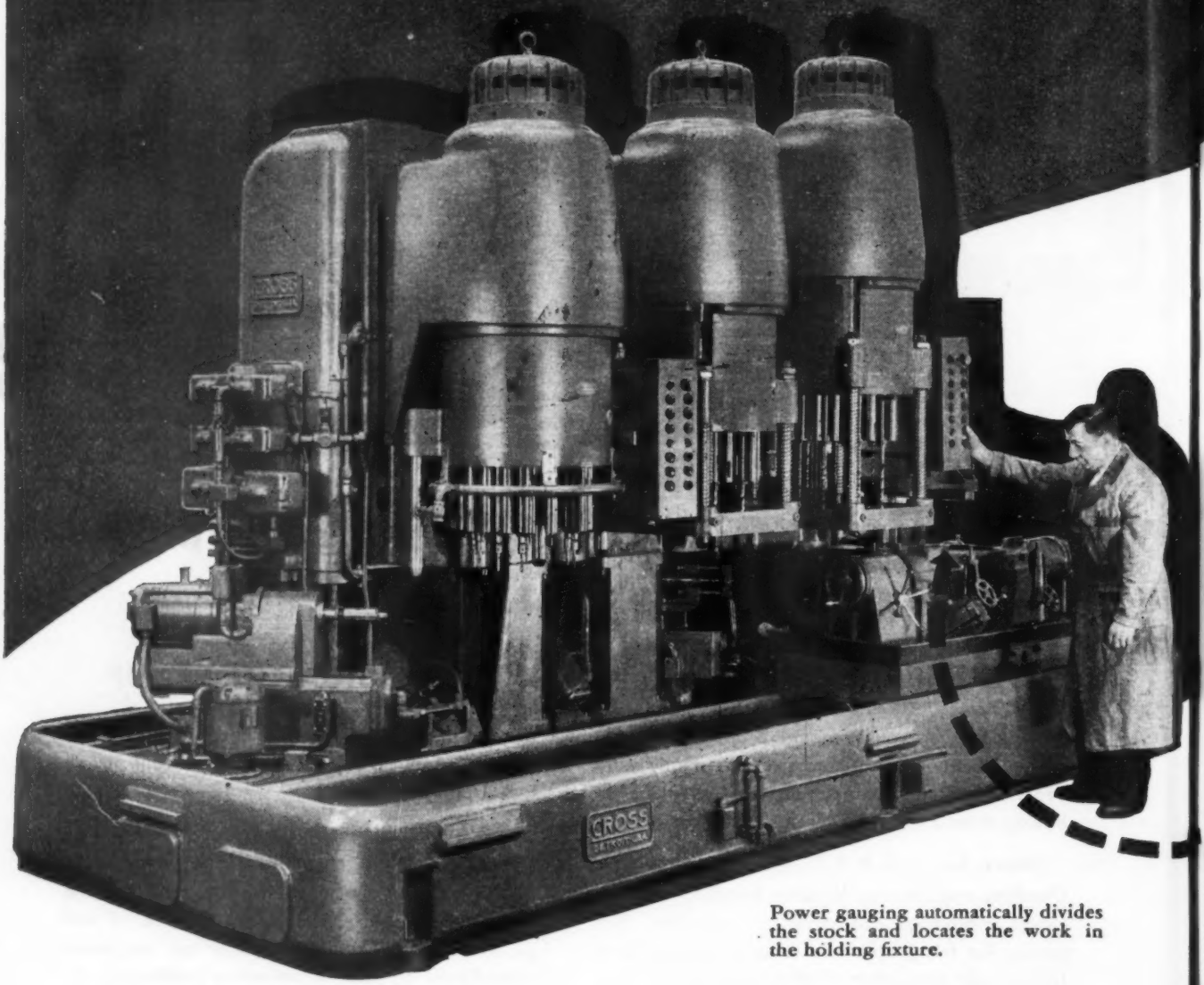
A BOND is a good buy for you and a "GOOD-BYE" to tyrants

P & J Rebuilding Service

P & J offers complete facilities for thoroughly rebuilding customers' P & J Automatics in our shop and restoring them to original productivity and accuracy. Re-tooling can also be handled at the same time.

MULTI-OPERATION MACHINE

Controlled by One



Power gauging automatically divides the stock and locates the work in the holding fixture.

CROSS

New York • Chicago • DETROIT • Cleveland • Dayton

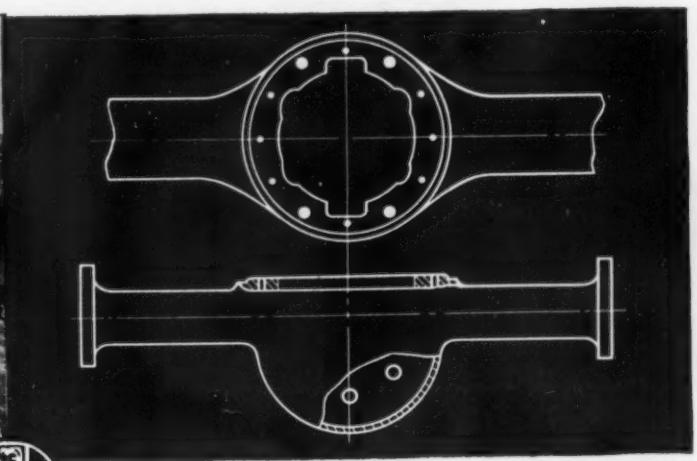
e Operator . . .

Precision Tolerances with *Unskilled* Labor

Progressive gauging, locating, drilling, countersinking and tapping operations are automatically performed with this Cross Transfer Type Processing Machine to finish 14 holes in three different planes in truck axle housings. Characteristic new features include: power gauging of the work to eliminate manual stock dividing with a height gauge to previous layout lines, automatic power indexing interlocked with precision locating of the work at each station, drilling and tapping of angular holes on the underside of the work simultaneous with overhead drilling of the flange holes, full electric push button control centralized for the operator's convenience.

One unskilled operator (female) and one Cross Processing Machine will do the work of ten skilled operators and ten standard machines with twelve unskilled helpers (male) for handling the work. Savings, through efficiency with existing manpower, are available to manufacturers using Cross Special Machinery for completing any one or a combination of turning, milling, drilling, boring, reaming, tapping, or grinding operations, at the push of a button.

Cross Engineering Service is available as a guide to cost reduction and improved use of manpower in your plant. A new Cross Catalog contains 35 detailed case histories of successful Cross Special Machines. For your copy, write on your letterhead to THE CROSS COMPANY, Detroit 7, Michigan, Department 91.



S-16

SPECIAL MACHINES

for automatically performing any one or a combination of metal cutting operations
TURNING · MILLING · DRILLING · BORING · REAMING · TAPPING · GRINDING

Power - Rigidity - Simplicity

GRAY SWITCH PLANER

● Power—Rigidity—Simplicity are the dominant characteristics of Gray Switch Planers.

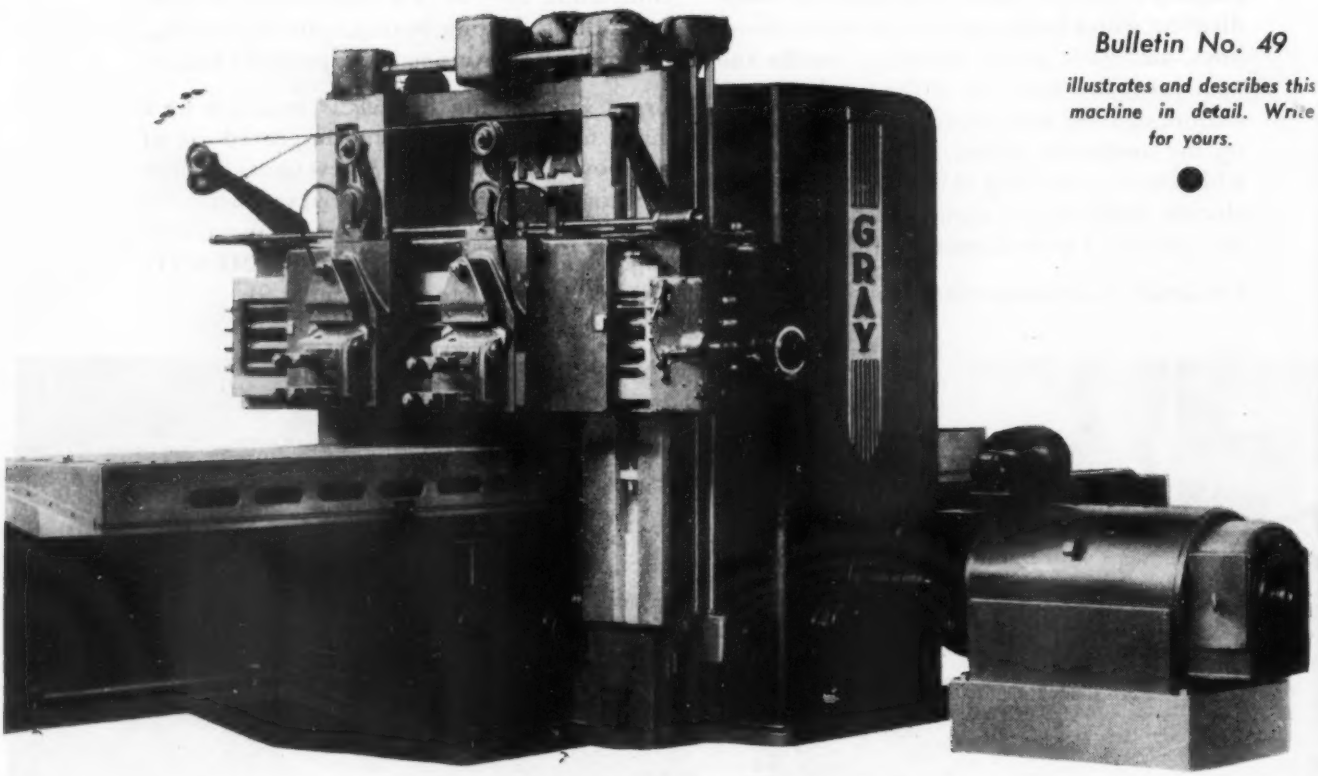
Power to drive cutting tools to their limit.

Rigidity to use that power effectively and without breakdowns or undue wear.

Simplicity so that even an inexperienced man can operate them without difficulty and with little effort.

The work done on these machines requires a planer of extraordinary power and rigidity, yet simple in construction and easily handled so that maximum production can be obtained with least operator fatigue.

In running the Gray planer, the operator from his normal operating position can feed either manually or by power; can rapid-traverse either one or both of the two massive heads without effort.



Bulletin No. 49

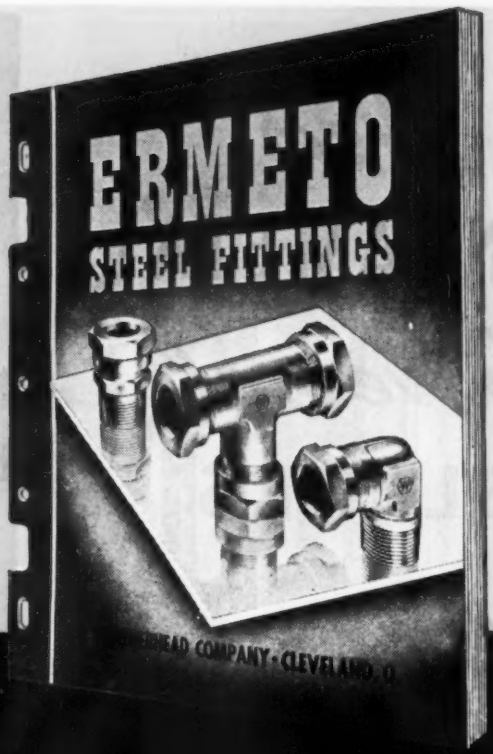
illustrates and describes this machine in detail. Write for yours.

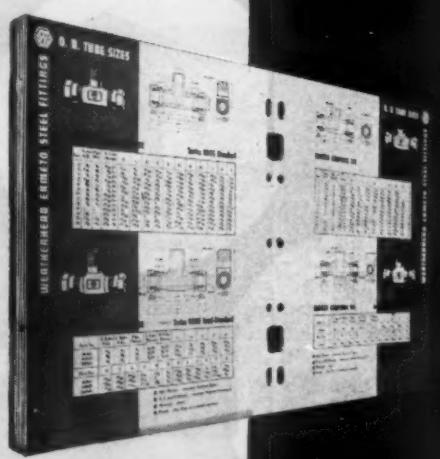
●

THE G. A. GRAY COMPANY
Cincinnati 7 Ohio, U. S. A.

THE GRAY LINE — Double Housing and Openside Planers, Switch Planers, Die Block Planers, Double-Housing and Openside Milling Planers, Planer Type Milling Machines, Horizontal Boring Machines

A must FOR YOUR CATALOG FILE





Every engineer, designer, service-man and industrial purchasing agent should have a copy of our newest Ermeto Fittings catalog, available for ready reference. This newest edition is the most complete to date and is yours for the asking. Write today or phone one of our branch offices.

Check these ERMETO features:

1 Easy and low cost installation. No flaring, welding, threading or soldering required!

2 Adaptable to all types of tubing connections—hydraulic, oil, water, gas and fuel lines!

3 Ermeto connections hold beyond the burst strength of the tube itself!

4 Ermeto joints withstand excessive vibration for an indefinite period!

5 Long life—proved in thousands of installations!

6 Unaffected by extreme degrees of heat or cold!

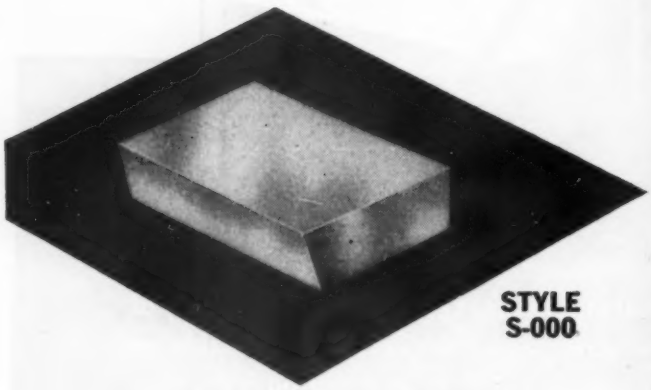
Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND 8, OHIO

Branch Offices: New York, Philadelphia, Detroit, Chicago, St. Louis, Los Angeles

New KENNAMETAL *"Universal"* BLANKS



FACILITATE TOOL MAKING

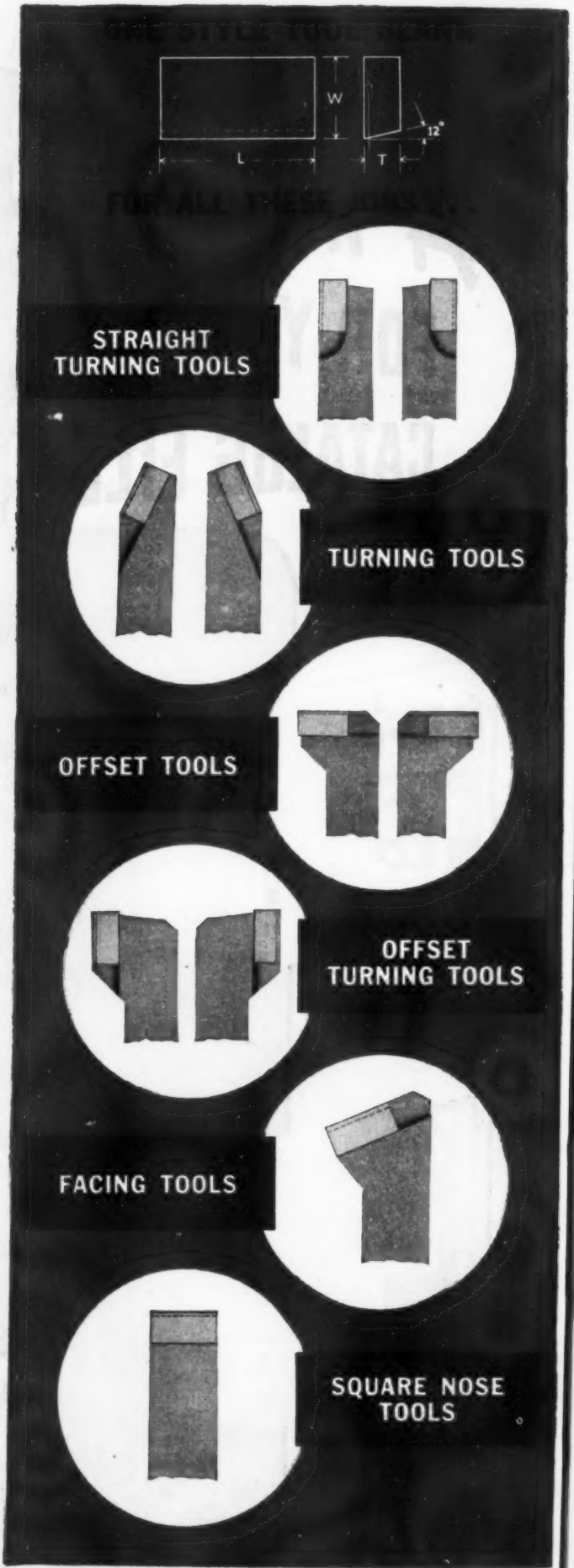
and Keep Stocks Down!

These new Kennametal "Universal" tool blanks are literally "jacks-of-all-trades." Rectangular in shape, with 12° clearance angle formed on one long edge, they can be used to make many different types of tools, simply by setting them into open-end recesses, as illustrated. They are available in all recognized standard sizes, many of which are stocked in several grades.

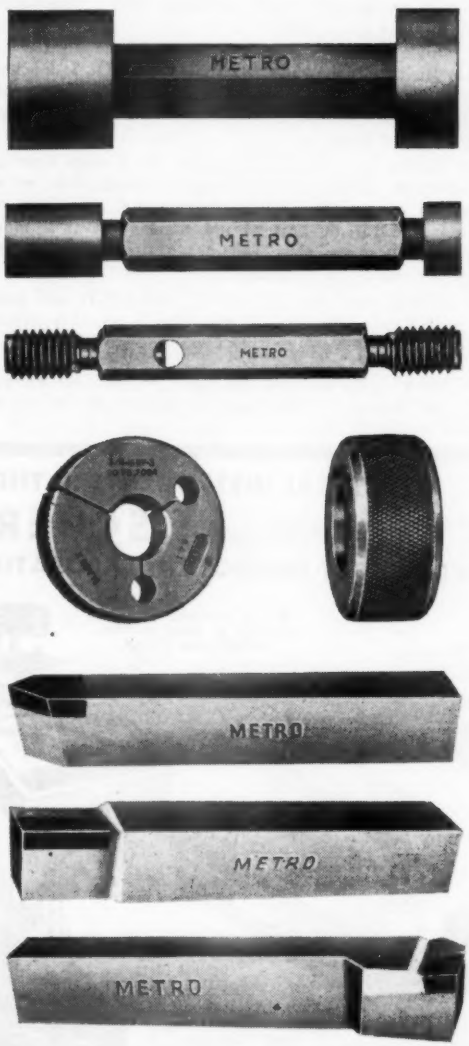
Their use reduces inventory investment, and simplifies stock room problems. And, above all, they make it easier for you to employ on a widespread, yet enonomical scale, the advantages of Kennametal — its ability to cut metal, including steel up to 550 Brinell hardness, accurately, at greatly increased speed, with amazing tool life.

Catalog particulars, and prices, are yours for the asking.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL Inc., LATROBE, PA.



DO YOU HAVE THE METRO *Catalog?*



IF NOT just drop a line and ask for Catalog No. 102 on the complete Metro line of Standard Gages and Carbide Tipped Tools.

The always dependable precision of standard Metro tools and gages has helped speed up war production and will be an important factor in postwar production too. Also, many a firm has been able to make production short-cuts by asking Metro engineers to design special tools and gages or make them up from specifications.

Metro Standard Gages and Carbide Tipped Tools are available for immediate delivery through your Metro distributor.

ARMY E NAVY

METRO

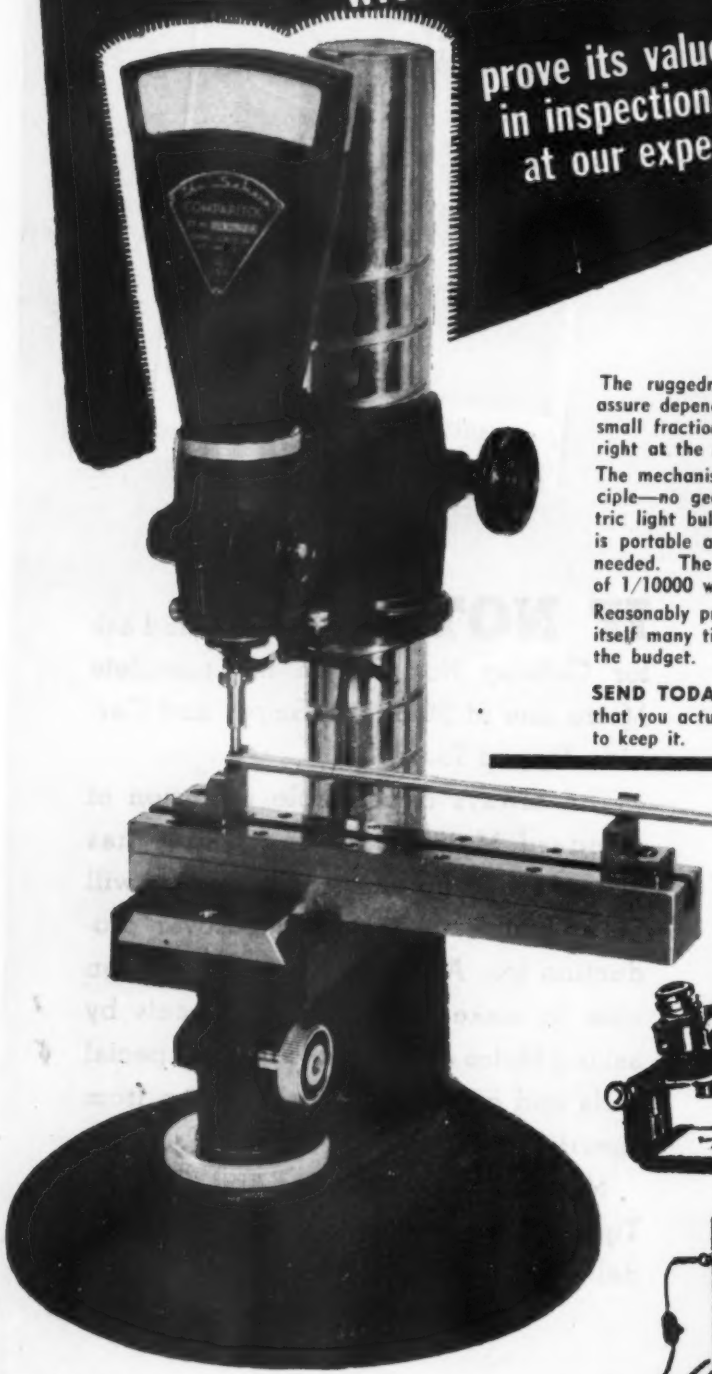
TOOL AND GAGE CO.

4240 Peterson Avenue

Chicago 30, Illinois

GIVE THE
SCHERR COMPARITOL
a 10-day trial
without obligation

prove its value
in inspection
at our expense



Ask FOR A DEMONSTRATION

HERE'S an opportunity to prove to yourself, on your own work, how you can speed up and simplify inspection—how you can measure to an accuracy of 1/10,000" or closer—right in the shop—spot-check work in process and maintain accuracy on all parts as they come through production.

The ruggedness and simplicity of the SCHERR COMPARITOL'S mechanism assure dependable accuracy for the checking of all types of gages and tools to small fractions of 1/10000" and also make it possible to use the instrument right at the machine by any operator.

The mechanism is based on the long tested and proven knife edge lever principle—no gears, or pinions, no electric current, or wire connections, no electric light bulbs, no warming up period are used or required. The instrument is portable and may be moved to any part of the shop wherever it may be needed. The scale has a wide range of 40 distinct easily seen graduations of 1/10000 which permit estimation to 1/100000".

Reasonably priced (only $195.00 net), the SCHERR COMPARITOL will pay for itself many times over regardless of the size of the shop or the limitations of the budget.

SEND TODAY for a SCHERR COMPARITOL for FREE TRIAL. All we ask is that you actually use it for 10-days and then decide whether or not you want to keep it.

TYPICAL INSTRUMENTS IN THE SCHERR LIMITED BUDGET INSPECTION LABORATORY

Wilder Projector for inspection by means of magnified image shadow
Spencer Binocular Microscope with 3-dimensional vision
Optical Flats
Toolmaker Microscope providing 4"x2" measuring capacity in tenths, angles in degrees and minutes.
Magni-Ray wide field magnifier

Ask to be placed on our mailing list to receive copies regularly of "precise Production" (a Scherr Publication on precision inspection). No obligation incurred.

GEORGE SCHERR CO.
INCORPORATED
200 LAFAYETTE STREET, NEW YORK 12, N. Y.

"SCRAP METAL JOE, I WAS CALLED IN THOSE DAYS"

"I turned out too darned much scrap. No matter how careful I was and how hard I tried, the scrap kept piling up. I lost faith in my skill—began to figure I was a lousy lathe operator and would never improve.

"Then one day they put me to operating a brand new LeBlond lathe. It seemed like a miracle was happening to me. The stuff I turned out was right on the beam. My scrap was way below the percentage estimated for the job. I was happy as a lark.

"I've been at that new LeBlond ever since, turning out swell stuff day in and day out. They don't call me Scrap Metal Joe anymore. No sir! It's Wizard Joe now. What made the difference? The new LeBlond lathe! That old junker I'd been running before never could be kept in proper adjustment for long—that's why all the scrap. This new LeBlond is a Lulu—when she's set, she's SET, and she turns the stuff out better and faster. Yep! You've got to have a good lathe if you want to turn out good work, less scrap."

LeBlond is building tomorrow's lathes today. They'll help you turn Scrap Metal Joes into Wizards. They'll help you meet tomorrow's greater, keener competition with confidence. Write for catalog.

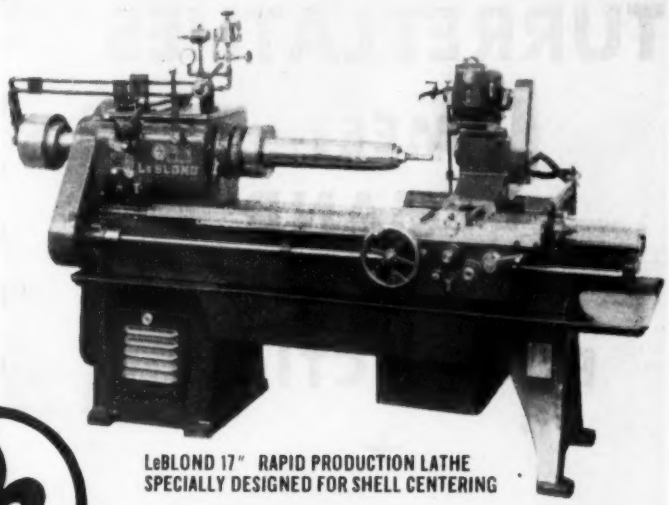
• TO HELP YOU . . .

We have been building lathes since 1887.

Today LeBlond Lathes are used on turning operations the world over. The accumulated knowledge of every manufacturing trend in good times and bad . . . peace and war, gained from thousands of installations is now available to you.

Our field engineers are at your service . . . ready to help you in your development work for the postwar era—particularly along the lines of the difficult, out-of-the ordinary turning problems.

This service is yours for the asking. Contact our nearest dealer or write—Department FE 46.



LeBLOND 17" RAPID PRODUCTION LATHE
SPECIALLY DESIGNED FOR SHELL CENTERING

LE BLOND

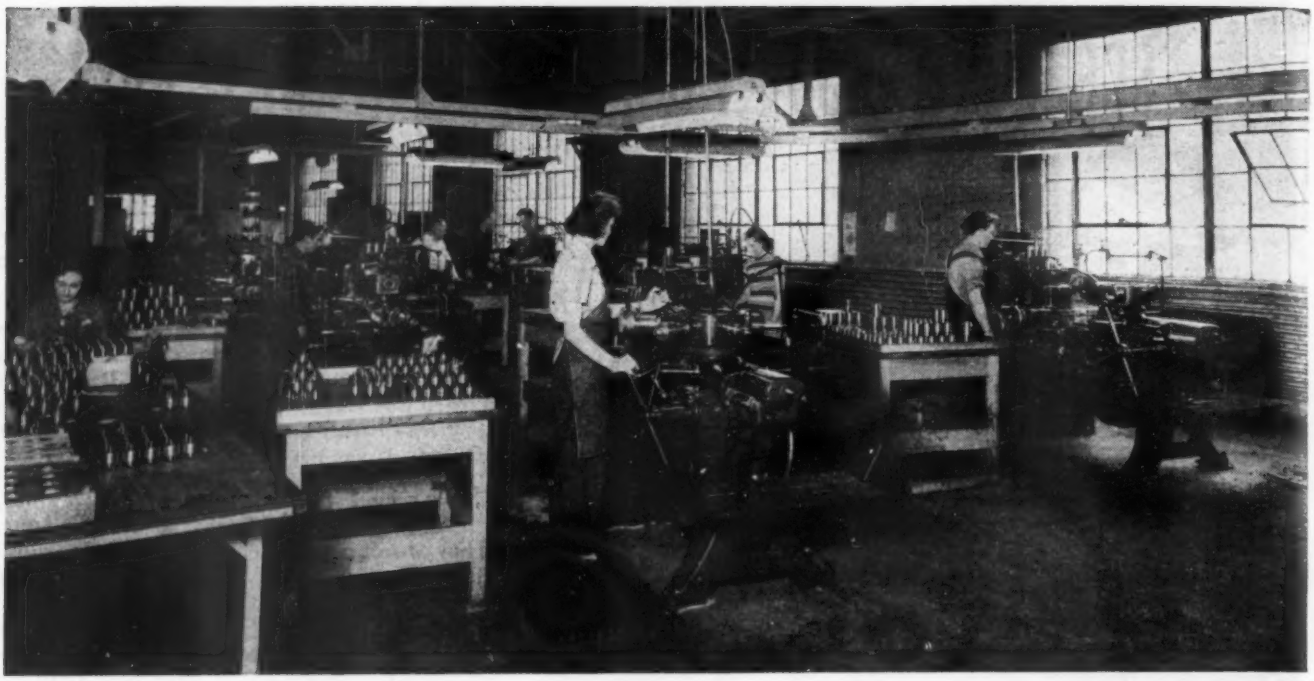
ARMY-E-NAVY ★ YOUR BONDS BUY BOMBS ★ BUY A "BLOCK-BUSTER" TODAY!

THE R. K. **Le BLOND** MACHINE TOOL CO., CINCINNATI 8, OHIO, U. S. A.

NEW YORK 13, 103 Lafayette St., CAnal 6-5281

CHICAGO 6, 20 N. Wacker Dr., STA 5561

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES



This battery of ACME TURRET LATHES MEET DEMAND FOR HIGH PRODUCTION

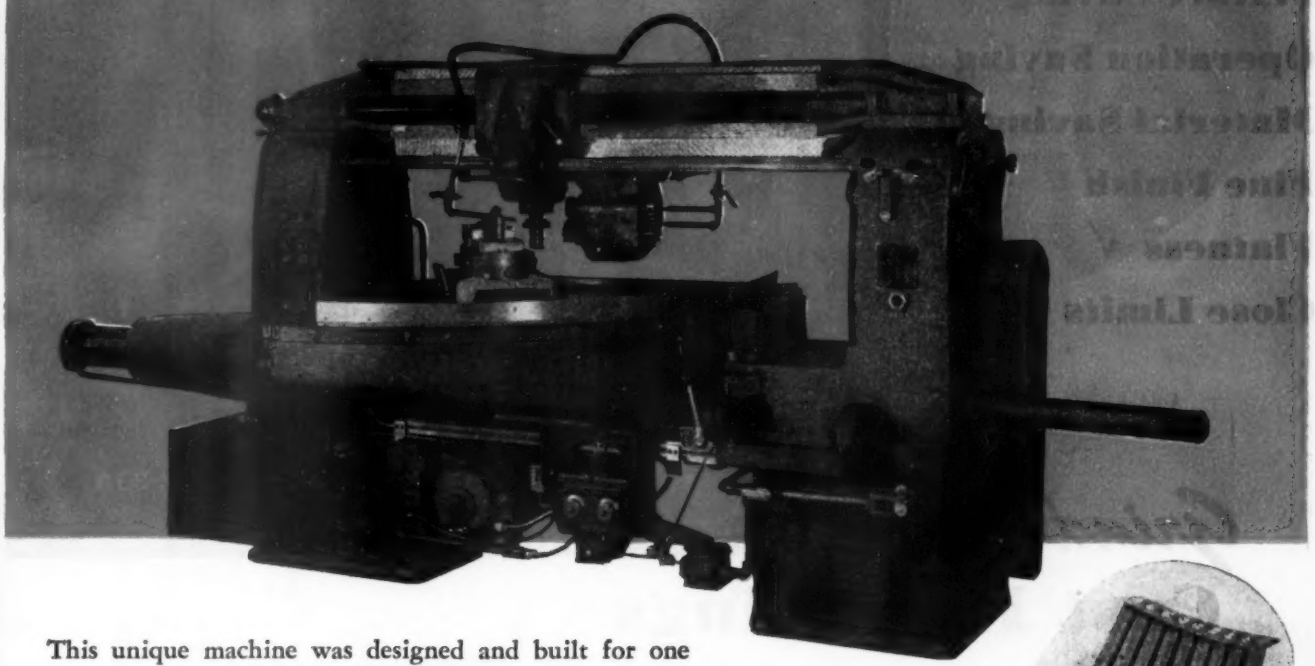
★

● For jobs such as these, shops use Acme Turret Lathes exclusively on high production war work. The sturdy, rigid, construction of the machine assures strict adherence to precision tolerances. The centralization of all operating controls makes for fast, easy operation. The simplicity of operation enables women operators to handle the machine with ease and produce precision work with very little training. The parts shown around the various machines are completely finished on this battery of Acme Turret Lathes. For power — precision — speed and flexibility, put your next job on an ACME.

The ACME MACHINE TOOL CO. ... CINCINNATI 32, OHIO.

MODERN RADIUS MILLER . . .

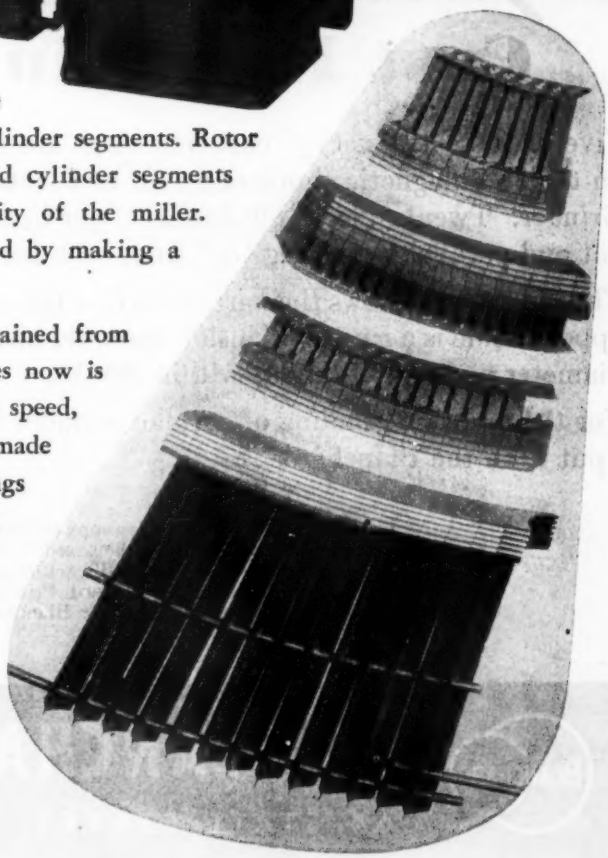
USES 30 TIMKEN BEARINGS



This unique machine was designed and built for one job — the milling of steam turbine rotor blade and cylinder segments. Rotor blade segments having a minimum radius of 6⅞" and cylinder segments with a maximum radius of 40" constitute the capacity of the miller. Segment thicknesses from 5/16" to 1⅝" can be milled by making a few simple adjustments.

Some idea of the efficiency of the machine can be gained from the fact that an operation which once took 25 minutes now is completed in 4½" minutes. Important contributions to speed, precision, low operating and maintenance costs are made by the use of 30 Timken Tapered Roller Bearings applied at vital positions throughout the miller.

Modern Tool Works, Ltd., know from long experience that it pays to have Timken Bearings in their equipment—and so do their customers. The Timken Roller Bearing Company, Canton 6, Ohio.



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

"Put it on the Blanchard"

...GET THESE ADVANTAGES

Production ✓
Adaptability
Fixture Saving
Operation Saving
Material Saving
Fine Finish
Flatness ✓
Close Limits

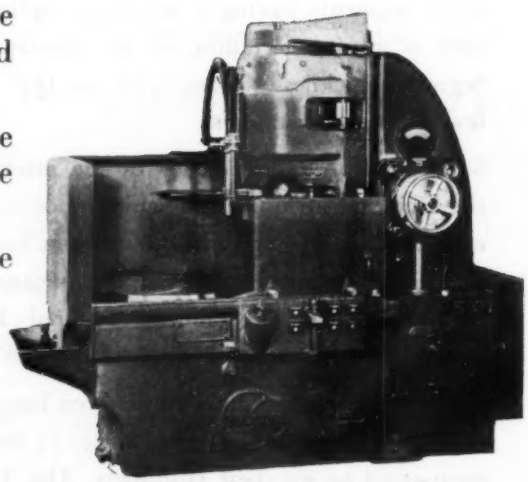
Grinding Cast Iron Rings

Five of these 12" x 1½" cast iron rings are securely held on the 36" magnetic chuck of a No. 18 Blanchard Surface Grinder. Twenty pieces (40 surfaces) per hour are ground flat and parallel, removing 1/64" from each surface.

The illustration shows the narrow surface being ground, the opposite side is a ring of 8" inside diameter and 12" outside diameter and is ground flat within .0005".

For the multiple grinding of parallel surfaces such as these "put it on the Blanchard".

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.



No. 18 BLANCHARD SURFACE GRINDER

BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

7 Reasons Why...

Curtis

SETS THE STANDARD

The "Quality" demanded by Curtis Universal Joint "Standards" gives every user of Curtis Joints a product that meets and surpasses rigid and strenuous wartime needs.

Each part shown has special features—successfully proven in hundreds of applications by airplane and machine tool industries.

Twenty years of experience selecting the right steels, special heat treatments developed by Curtis, careful machining to close tolerances, finished ground surfaces all accurately fitted to give positive, free articulation, are incorporated into each part.

Figs. 1 & 2 FORKS — heat treated to secure maximum toughness and strength, inside ear surfaces accurately ground for close, smooth working operation, pin holes broached and honed for perfect alignment, the O. D. cylindrically ground for concentricity.

Fig. 3 CENTER BLOCK — holes intersecting accurately in the center, with the faces parallel, hardened and precision ground for long wear, with recess for the Telltale Lock ring.

Figs. 4 & 5 PINS — hardened and centerless ground to close tolerances reduce radial play.

Fig. 6 OILER — Curtis pioneered proper and essential lubrication, and made it easy by furnishing patented oilers in the large pin.

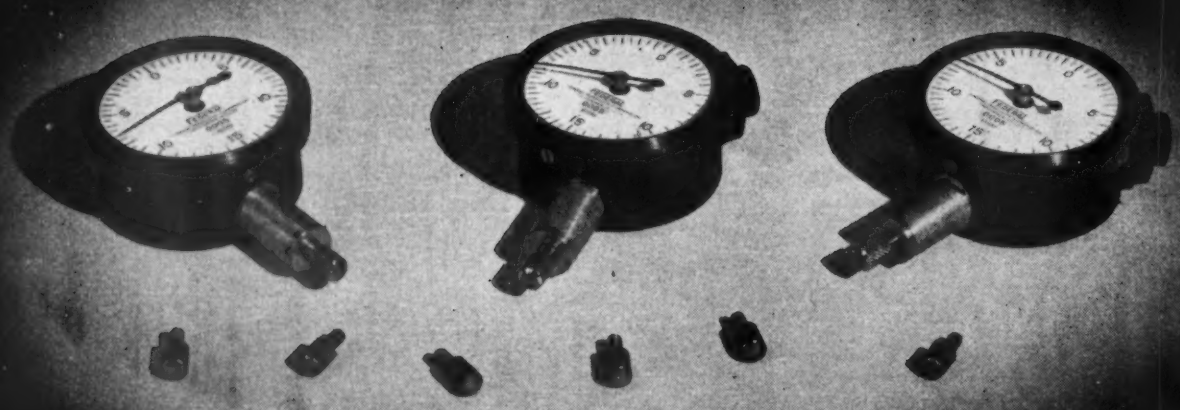
Fig. 7 "TELLTALE" LOCK RING — patented by Curtis — snaps into small pin groove and fits recess of center block. This insures firm, positive lock-up of entire assembly — makes disassembly and reassembly quick and easy, and the "Telltale" end shows at a glance that the ring is in proper locking position.

Curtis Engineers can help solve your universal joint problems. Our experience and knowledge is yours for the asking.

CURTIS UNIVERSAL JOINT CO. INC.

SPRINGFIELD, MASS. • BOSTON GEAR WORKS, NO. QUINCY, MASS., SOLE DISTRIBUTORS

NORBIDE* POINTS *the way to*
Increasing Dial Indicator Gage Life 100 times



NORBIDE Tips for dial indicator gages are extremely wear-resistant, will not scratch and will not become charged with particles of metal. For NORBIDE (the trade-mark of Norton Boron Carbide) is the hardest material made by man — second only to the diamond in hardness. This explains the extraordinarily long life of NORBIDE plug, ring, snap and keyway gages and dial indicator gage points.

NORTON COMPANY - Worcester 6, Mass.

*Hardest Material Made by Man

DIAL TEST INDICATORS

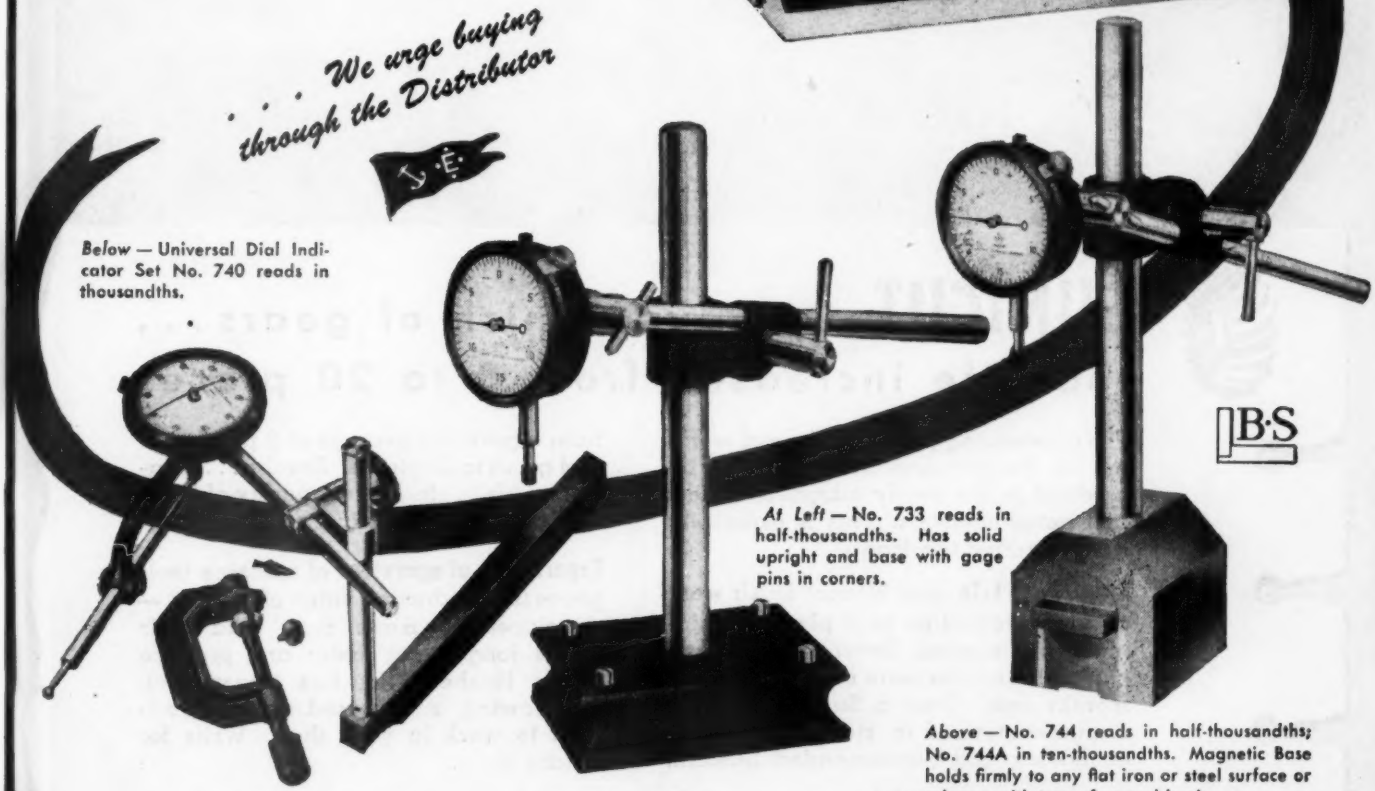
For Varied Requirements

At Right — No. 725 reads in thousandths; No. 725A in ten-thousandths. These small Dial Attachments are only 2¾" long, over-all.

At Right — No. 731 reads in half-thousandths; No. 731A in ten-thousandths. Extremely rigid. Tubular construction. Individual clamp for each adjustment.
(No. 730, of lighter construction, reads in half-thousandths.)

These Dial Test Indicators have the conveniences of design and accuracy that characterize Brown & Sharpe Tools. Each is intended to give a long life of satisfactory, reliable service. Know the complete line of Brown & Sharpe Dial Test Indicators and Attachments shown in Catalog No. 34. Copy sent upon request. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

. . . We urge buying through the Distributor



Below — Universal Dial Indicator Set No. 740 reads in thousandths.

At Left — No. 733 reads in half-thousandths. Has solid upright and base with gage pins in corners.

Above — No. 744 reads in half-thousandths; No. 744A in ten-thousandths. Magnetic Base holds firmly to any flat iron or steel surface or releases with turn of control knob.

BROWN & SHARPE TOOLS

SUNICUT improves finish of gears... tool life increased from 8 to 20 pieces

The outstanding progress of metal working in the aviation industry may be credited to the ready adoption of new and better methods. This is especially true in cutting lubricants!

Short Tool Life and inferior finish were slowing production in a plant machining airplane gears. Several well-known cutting lubricants were used up to seven months ago. Then a Sun Cutting Oil Engineer stepped in, studied operating conditions and recommended Sunicut.

Output increased 150% per tool grind. With Sunicut they increased tool life from a previous average of 8 pieces per tool grind to 20 pieces. Results . . . longer tool life . . . improved quality of finish . . . less time lost for tool resetting.

Experiences of operators of machine tools prove the production value of Sunicut — developed to make tools hold their edges longer, cut faster and produce better finishes. Put this transparent, free-flowing, sulphurized cutting lubricant to work in your shop. Write for details to . . .

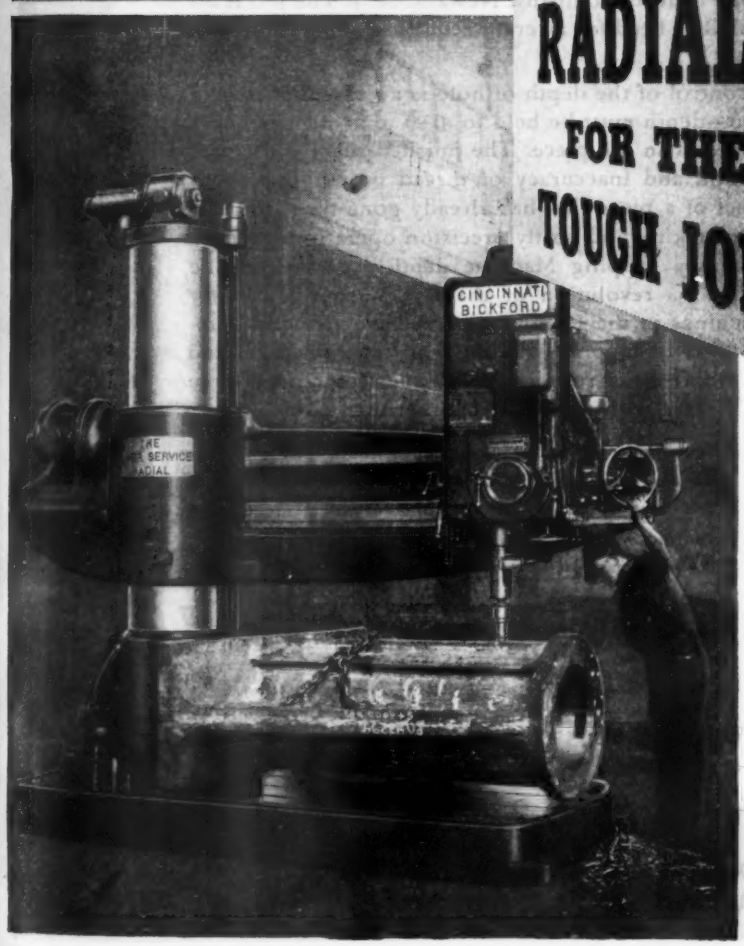
SUN OIL COMPANY • *Philadelphia 3, Pa.*

Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

SUNOCO

SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY



Super Service RADIALS FOR THE TOUGH JOBS

FOR precision workmanship within their respective ranges, no work is too heavy or too difficult for the Super Service Radials at the plant of the Erie Foundry Company at Erie, Pa. In this plant the features of these efficient machine tools are applied to greatest advantage for speedy and accurate production . . . they will similarly assure improved workmanship in your plant. Features include • easy handling (operator finds all controls centralized for instant accessibility) • power and speed are maintained under heavy load • positive feed clutch • compensating depth gage • constant direction of spindle rotation • instant spotting with power rapid traverse • ample safety devices • ultra-rugged construction. Write for latest literature and illustrated bulletins on the complete line of Super Service Radials.

ARMY E NAVY

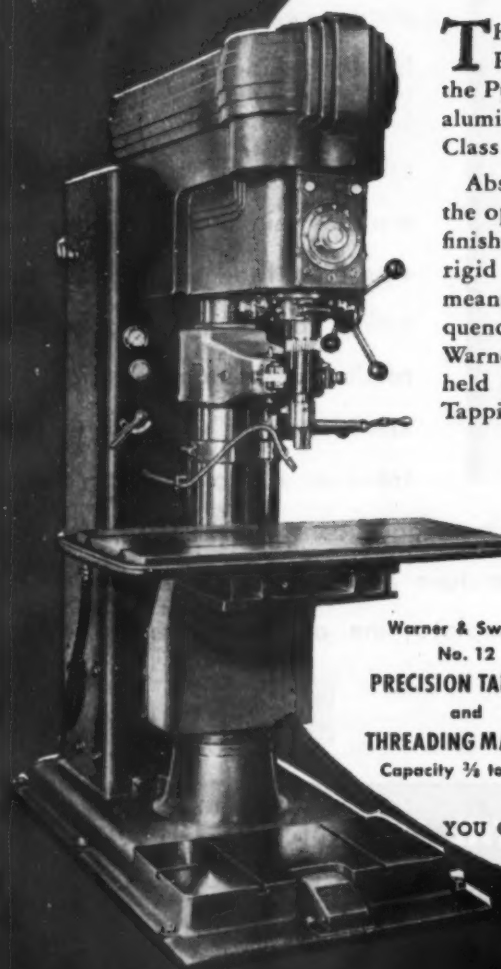
THE CINCINNATI BICKFORD TOOL COMPANY

OAKLEY, CINCINNATI 9,
OHIO, U. S. A.

WHEN DEPTH OF TAP IS ALL IMPORTANT

THE illustration above shows a Warner & Swasey No. 12 Precision Tapping and Threading Machine at work in the Purolator Products Company, Newark, N. J. The job is an aluminum oil filter head for aircraft, requiring a ¾"-18 thread, Class 3 fit.

Absolute control of the depth of hole is an essential part of the operation—depth must be held to .010 to avoid striking a finished valve seat in the piece. The finished piece must pass rigid inspection and inaccuracy of thread or tapping depth means a reject of a piece that has already gone through a sequence of time-taking and costly precision operations. With a Warner & Swasey Tapping Machine depth accuracy can be held to within 1/10 revolution of the tap. Warner & Swasey Tapping Machines in the Purolator plant have virtually eliminated tapping troubles and tap breakage, and have been running continuously for over three years with minimum maintenance cost.



Warner & Swasey
No. 12
PRECISION TAPPING
and
THREADING MACHINE
Capacity ⅜ to 2½"

Your Warner & Swasey representative will be glad to explain the new lead screw principle and many other advantages of this revolutionary tapping and threading machine. It can aid war production now and put you in better position for postwar competition.

Write for a catalog describing four models of Warner & Swasey Tapping and Threading Machines, capacities from 0-80 to 2½", free on request.

WARNER & SWASEY
W & S
CLEVELAND

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS ... WITH A WARNER & SWASEY

On the Political Level

WASHINGTON'S program for handling the disposal of surplus equipment is bearing out the worst fears of the critics.

Industry and the general public have every right to expect that politics would be barred in solving this vital problem that involves billions of dollars of taxpayers' money and will have a terrific impact upon our national economy if mismanaged.

But has politics and inexperience been banished? The appointment of ex-Governor Hurley and Colonel Heller makes the answer quite obvious. Both men are known for their political aggressiveness. Senator Gillette, though not yet officially named but prominently mentioned, is in the same dubious class.

If ever skill, knowledge, experience and appreciation of industry's postwar problems are needed, this important surplus disposal board is the place for such qualifications. Yet not one of the men appointed or considered for the important task comes anywhere near meeting the requirements.

In pleasant contrast to our policy of picking out people to administer tasks that they apparently know nothing about, is the program already taking shape in Britain for solving her surplus equipment problem. It is worthy of close study here.

Responsibility for disposal of machine tools and other production equipment is in the hands of Machine Tool Control — an agency that has within its closely-knit ranks the complete control of machine tool production, utilization, prices and surplus disposal. It is staffed by experienced men from the British metal-working industry and by competent civil servants. By no stretch of the imagination can it be charged that MTC is political in its set-up. It has been brilliantly operated by Sir Percy Mills, a distinguished British industrialist. Now that he has other important duties, MTC is handled by an equally competent administrator.

Certain broad rules are to govern the British disposal program: 1) The disposal must be orderly; 2) speculators must take no part in it; 3) the market for new machine tools must not be destroyed, thus protecting the British machine tool industry; 4) as many old machines as possible must be scrapped; and 5) the newer surplus machines must be used to help modernize Britain's industries.

MTC is now assembling a staff from the machine tool industry to appraise the value of surplus machines and to determine the prices at which they are to be sold. While maximum and minimum levels will be set, appraisers will have the authority to name prices on the basis of the condition of the machines rather than merely age.

Note that the men in charge of the program are not political appointees or Army captains or lieutenants who don't know a lathe from a milling machine. Instead they are men with a hard-and-fast knowledge of the many different machine tools.

Why is it that we in this country, with more "know-how" about production of goods than any other nation in the world, can't approach our disposal problem in a business-like fashion and as intelligently as Britain?

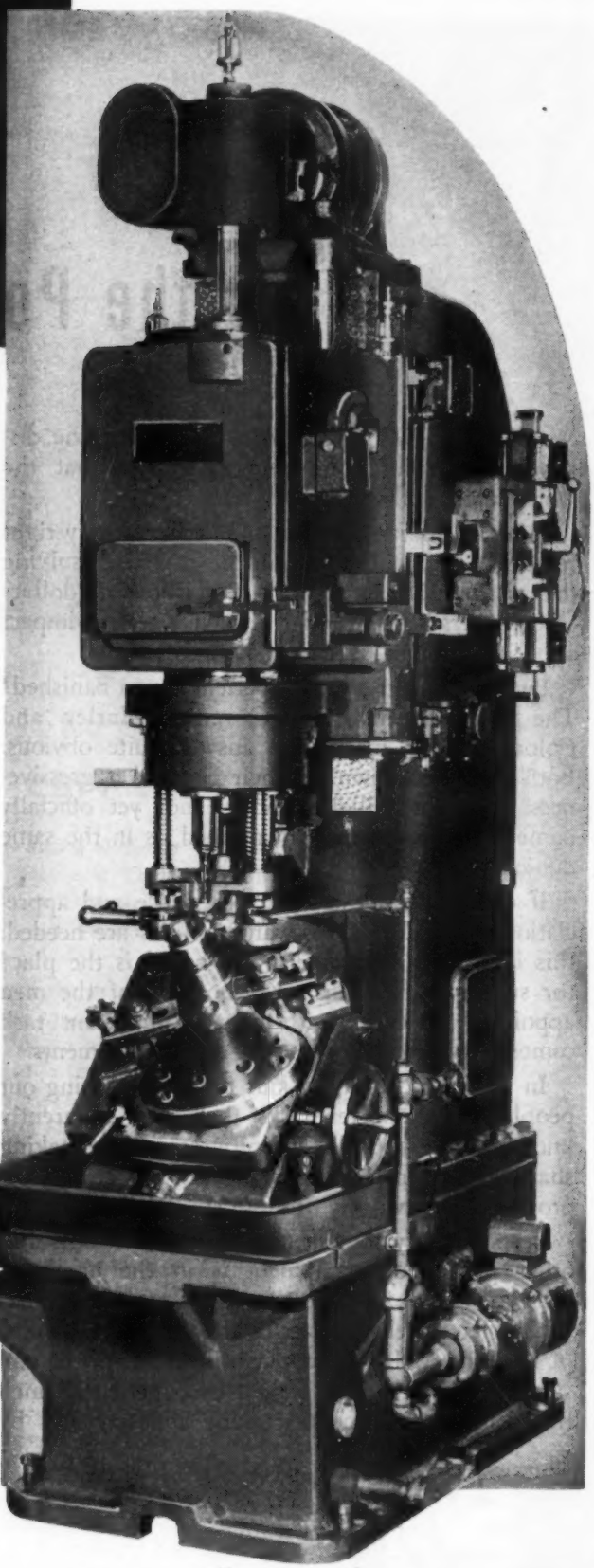
Must we be resigned to solving our economic problems on a political level?

Burnham Finney

MORRIS

High Production

Vertical Drilling Machine



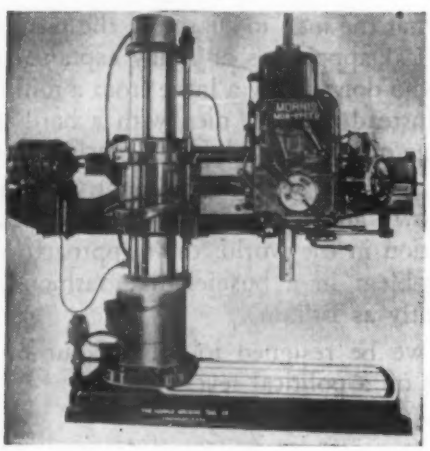
● Drilling-reaming-counterboring angle holes in the crankshaft shown, on a production basis, was the problem solved by the accompanying Morris Vertical Production Machine.

This machine features a hydraulic feed mechanism and a three station automatic indexing head. Note sturdy base and column construction insuring utmost rigidity.

It is also a typical example of the wide variety of special production machines designed, developed, and built by Morris for specific operations on work desired in quantity at low cost.

On your high production jobs requiring drilling-reaming-boring-counterboring and similar operations, consult Morris Engineers—they can help you.

★



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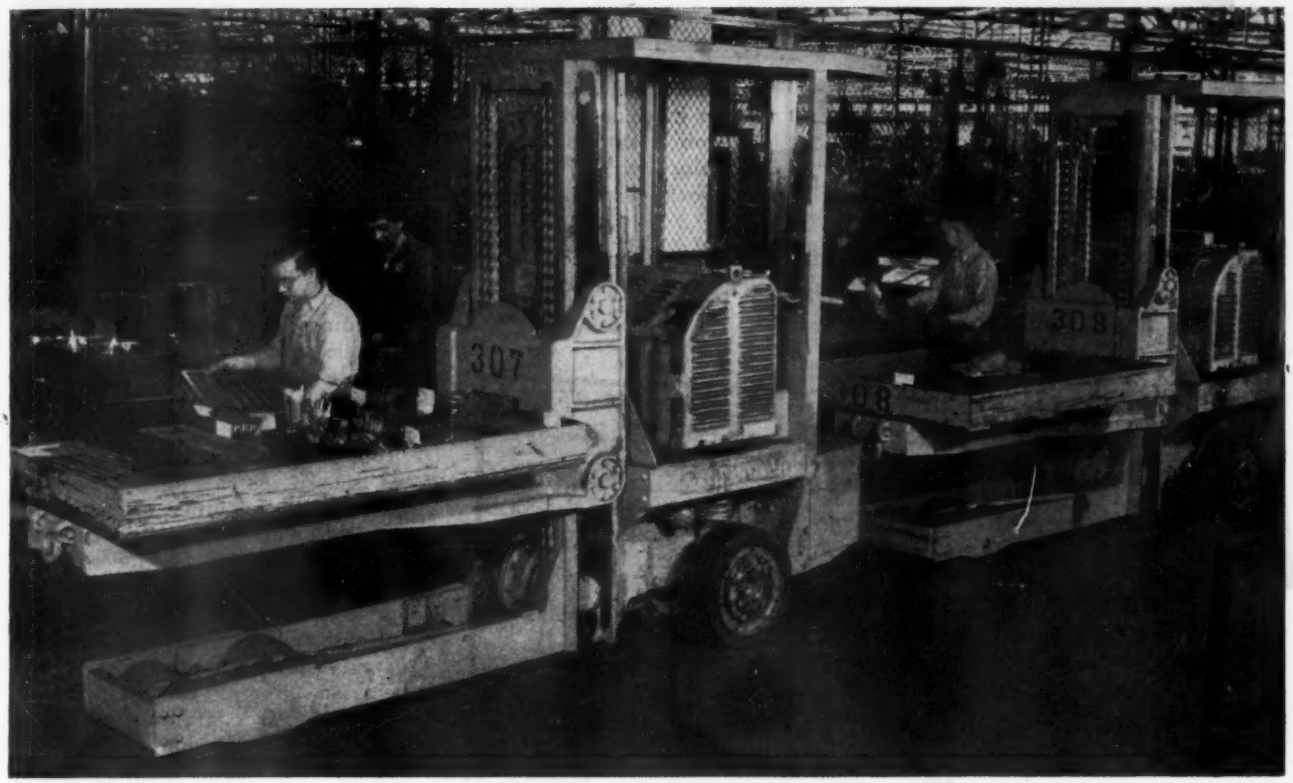
Builders of MOR-SPEED *Radials*

The MORRIS *Machine Tool Co.*

CINCINNATI 3, OHIO



Power lift trucks with large trays on the lift platform deliver boxes of sharpened tools to the production department on regularly scheduled trips. At the crib, sets of used tools are delivered to the receiving window at the right, then the truck picks up sets of sharpened tools from the disbursing window at the left for delivery to individual machines

Efficient Tool Control System Curbs Waste in War Production

Survey at a General Motors plant established a four-hour tool replacement schedule, minimized idle time at machines, and led to a sound tool-sharpening plan

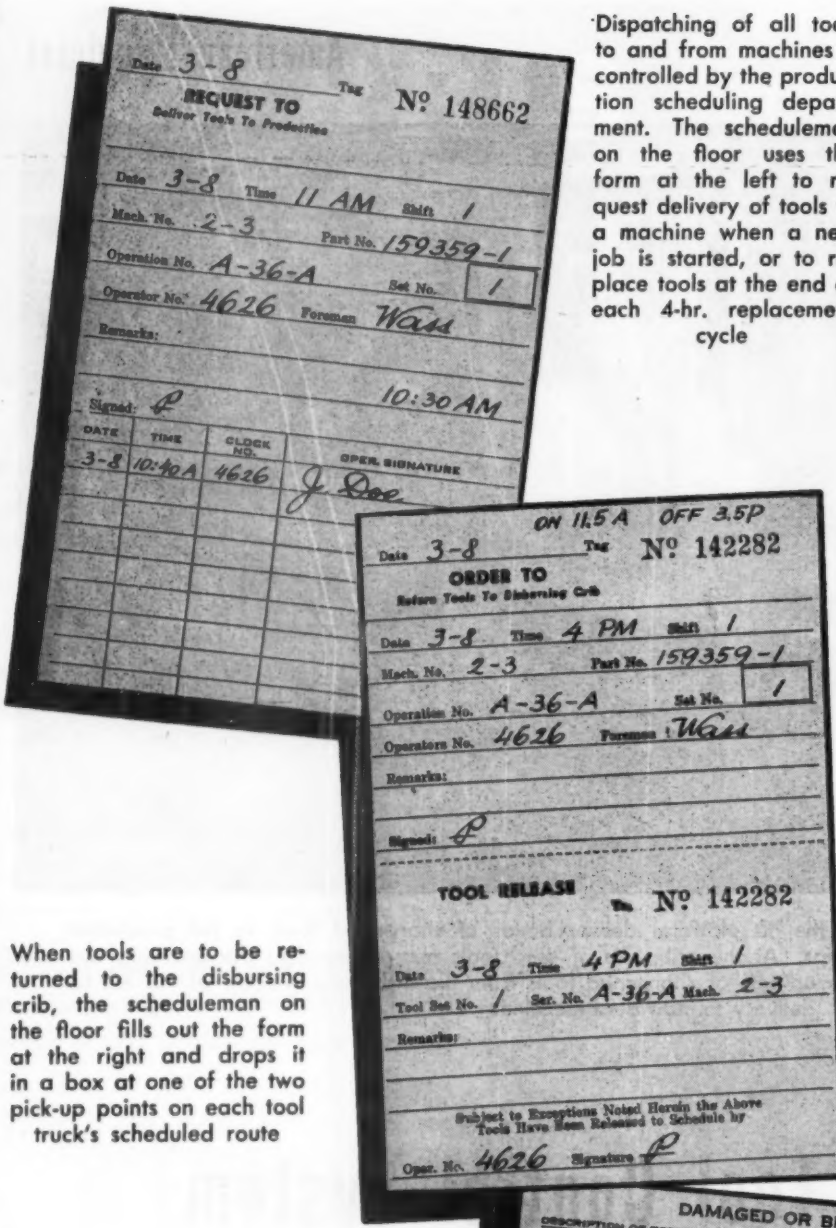
CONVERSION of the Grand Rapids Stamping Division of General Motors Corporation from peacetime to wartime production led to an exhaustive survey of the plant's service departments to achieve maximum operating efficiency in the use of metal-cutting tools rather than sheet-metal blanking and forming equipment with which the operators were familiar.

The survey resulted in establishment of a tool control system integrated with the production control system. Operation improvements were multifold: Tool deliveries were placed on an efficient basis; much needless tool truck travel was eliminated; machine and operator idle time was minimized; tool life was improved; and over-all operation efficiency was improved. Process and production engineers, time-study engineers and tool specialists cooperated in establishing the tool control system.

Originally the plant had one tool-grinding room and three tool-disbursing cribs. The new program eliminated one tool crib. One of the remaining cribs was located adjacent to the tool-grinding room, thus eliminating trucking between the two points.

Time studies revealed considerable unnecessary travel by tool delivery and pick-up trucks. A system

Dispatching of all tools to and from machines is controlled by the production scheduling department. The scheduleman on the floor uses the form at the left to request delivery of tools to a machine when a new job is started, or to replace tools at the end of each 4-hr. replacement cycle



Date 3-8 Tag Nº 148662
REQUEST TO
Deliver Tools To Production
Date 3-8 Time 11 AM Shift 1
Mach. No. 2-3 Part No. 159359-1
Operation No. A-36-A Set No. 1
Operator No. 4626 Foreman Wm
Remarks:
Signed: P 10:30 AM

DATE	TIME	CLOCK NO.	OPER. SIGNATURE
3-8	10:40A	4626	J. Doe

ON 11.5A OFF 3.5P
Date 3-8 Tag Nº 142282
ORDER TO
Return Tools To Disbursing Crib
Date 3-8 Time 4 PM Shift 1
Mach. No. 2-3 Part No. 159359-1
Operation No. A-36-A Set No. 1
Operators No. 4626 Foreman Wm
Remarks:
Signed: P

TOOL RELEASE Tag Nº 142282
Date 3-8 Time 4 PM Shift 1
Tool Set No. 1 Ser. No. A-36-A Mach. 2-3
Remarks:
Subject to Exceptions Noted Herein the Above Tools Have Been Released to Schedule by
Oper. No. 4626 Signature P

When tools are to be returned to the disbursing crib, the scheduleman on the floor fills out the form at the right and drops it in a box at one of the two pick-up points on each tool truck's scheduled route

of scheduled routes was established to curtail overlapping. Each truck passes given points every half-hour. Drop boxes at two points on each route permit special tool requirements to be taken care of quickly. A group scheduleman leaves requisitions covering special tool equipment at a pick-up point along the truck route. The necessary tools are delivered to the designated operator's machine on the next truck trip a half-hour later. This eliminates the need of operators and foremen making trips to the tool crib. Each scheduleman is responsible for material and tools, including jigs, fixtures and cutting tools, being at each machine when needed.

The tool control plan calls for the regular return of all cutting tools to the central crib for inspection, resharpening and redistribution as required. Complete sets of tools are scheduled to the various machines according to the operations to be performed. The sets comprise the entire complement of tools necessary to complete the operation.

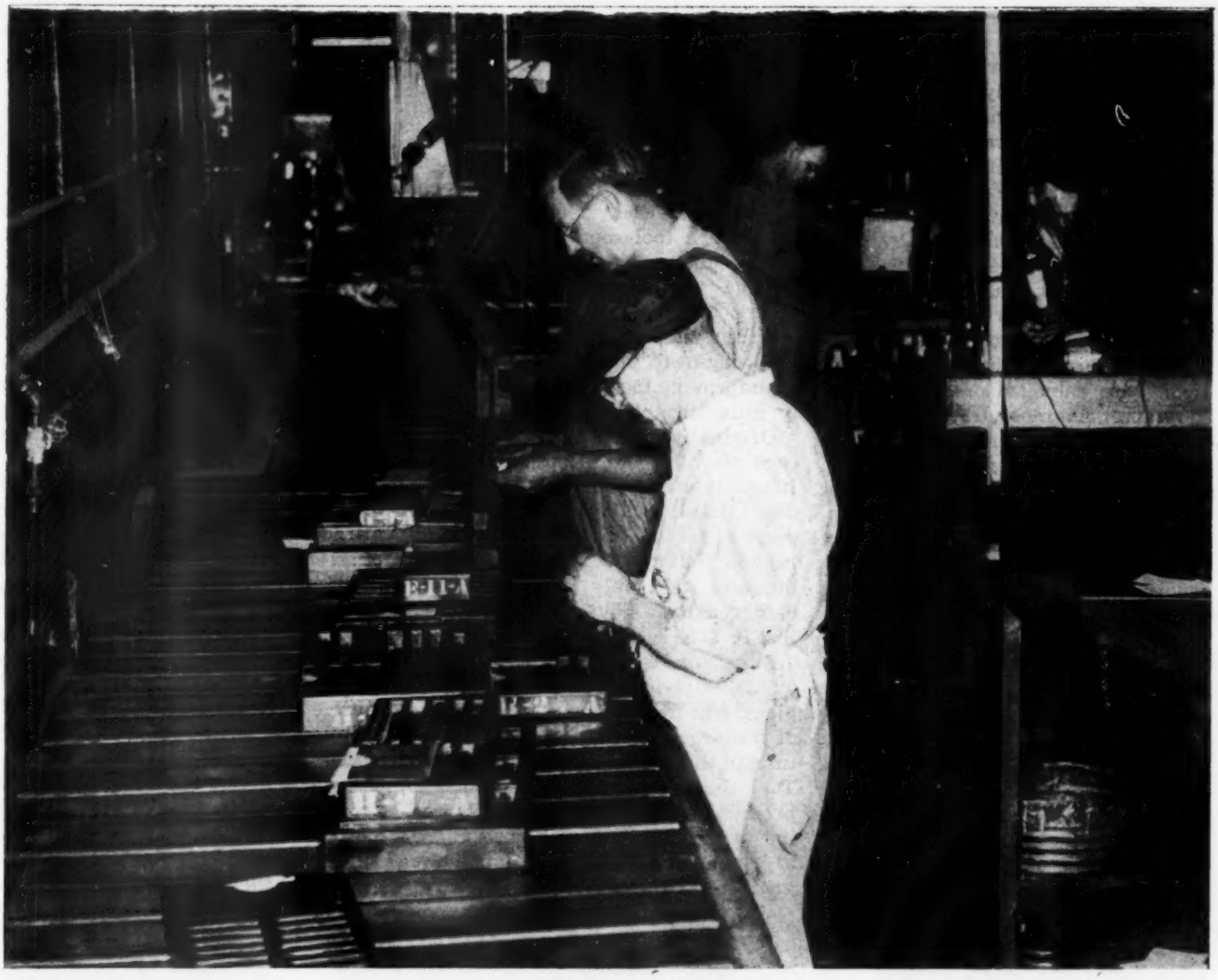
A four-hour tool replacement cycle became effective. Use of tools at the machines is thus limited to four hours. This has been found advantageous in that limitations on the length of time a tool can be used frequently makes it possible to hone the cutting edges to first-class condition without the necessity of regrinding for sharpening. Tool life is increased about 30 percent; quality of work has improved; and the amount of scrap produced by dull tools has been minimized.

Tool boxes of two types are used: One is used for cutting tool holders and shanks; the other contains the cutting elements. The first type of box is delivered to the machine in the morning and picked up at the end of the shift. If the job runs continuously, the boxes are picked up and replaced at the end of the estimated life of the holders or shanks. Boxes containing the cutting elements are delivered under the four-hour replacement cycle. If the normal expected life of a tool is less than four hours, a duplicate is included in the box. Spare tools are included for operations where there is excessive tool wear or breakage.

Crib attendants prepare the boxes of tools in advance. Upon receipt

DAMAGED OR BROKEN TOOL REPORT Nº 24758
DESCRIPTION OF TOOL
NAME & NO OF MACHINE
SPINDLE R. P. M.
RATE OF FEED
MATERIAL BEING CUT
DEPTH OF CUT
WAS CORRECT TOOL USED
NATURE OF DAMAGE
POSSIBILITY OF SALVAGE
CAUSE OF BREAKAGE OR DAMAGE
CORRECTIVE MEASURES TAKEN
OPERATOR'S NAME
DEPARTMENT
CLOCK NO.
FOREMAN
SHIFT
TIME
DATE
SUP'TS COMMENTS
GEN'L FOREMAN
SUP'TS SIGNATURE
USE REVERSE SIDE FOR NECESSARY ADDITIONAL INFORMATION

This "damaged or broken tool report" form must be filled out for each tool returned to the crib in bad condition. Regular meetings of interested supervisors review these reports to determine disposition of the damaged tools



Upon return from the floor, each tool is examined carefully and those needing attention are removed from the set boxes for sharpening or repair. Each box carries a plate listing the tools the box should contain

GR-1100

DATE 3-8

SHIFT 1

REQUEST FOR REPLACEMENT OF TOOL RECEIVED IN NON-USABLE CONDITION

MACHINE 5-13

TOOL NO. A-13-F

SET NO. 2

Reason for Rejection Not enough secondary clearance

(Have Tool Engineer investigate) WAS TOOL USED YES

HOW LONG 10 minutes

Crib Attendant Note:
Do not replace any tool unless this request is signed by both Foreman & Scheduleman

FOREMAN R. Smith

SCHEDULEMAN C.D.

In the few cases when tools are received in the shop in non-usable condition, the scheduleman uses the above form for requesting replacements. These requests are reviewed by an investigation committee

GR-1064

TOOLS TO BE REPLACED IN BOX

BOX NO. 12

Pieces	Tool Number
3	A-21-B
1	A-21-C
2	A-21-D

Tool sets returned from the production groups are inspected, and damaged, broken, and worn tools are removed. This tool replacement slip is placed in the box by the tool inspector as authorization to crib attendants for replacement of the removed tools

of the scheduleman's requisition, the sets are released for delivery. The scheduleman usually arranges to have the tools on hand about one hour before they are needed. This permits coverage of slight variations in the schedule. The scheduleman also orders the return of tool sets to the disbursing crib by filling out another type of requisition, which in effect releases the tools by the production department.

Each tool box returned to the crib must contain all of the original tools. If any are damaged or broken, the shop foreman must transmit a detailed report on the operation in which the tool was used, and cause of the breakage or damage. If such reports do not accompany the tools to the crib, the box is returned to the production department until the reports are made.

Returned tool sets are inspected and checked to determine whether regrinding is necessary. Those needing regrinding or honing are removed from the sets and listed on a form. Replacement tools are added at the crib, and the box is taken to a point where inspectors check each tool in the completed set, etch the tools with code numbers, and then store the boxes in racks until needed. Dull tools are ground and honed, inspected, sealed and replaced in the bank stock for storage.

Reports on damaged or broken tools are examined regularly at tool meetings attended by the tool engineer, a general shop foreman, the grinding room foreman, and a tool checker. The disposition of each damaged tool is determined and listed on a tool report form. Many of the tools are sent to the tool salvage group for repair, while others are scrapped. Tool reports are recapitulated monthly so the tool engineer can devise methods for improving tools which consistently cause trouble.

Originally tool meetings were held each morning and often as many as 100 tools were reviewed in a single day. Under the new system, however, so few tools are returned with broken tool reports that the meetings are held only when sufficient damaged tools have accumulated to justify such a session.

Sufficient replacement tools are available to meet the four-hour replacement cycle. Thus the necessity of resharpening tools upon their return to the crib has been eliminated. Tool sharpening is now done on a production basis, with like tools being held until there are enough for a production grinding set-up in the grinding room.

All tool grinding is performed in the grinding room adjacent to the disbursing crib. They are ground to prints which specify the angles of the cutting edges, and the only person who can alter a tool print is the tool engineer in charge of the program. No foreman, for example, can enter the grinding room and have tools ground to his personal specifications.

Each tool is inspected after resharpening and, if approved, is delivered to the tool bank in the crib. Rearrangement of the grinding room and its operations has effected marked improvement.

To protect sharp-edged cutting tools from damage in storage, adhesive tape coverings were used originally. Now, however, the tools are protected by dipping them in ethyl-cellulose maintained in a molten state. The one-dip coating is fairly heavy and affords greater protection. The coating equipment virtually paid for itself in one month because it is time-saving and more economical. The coating material is reclaimable and can be reused until dirt and foreign matter prevent its free-flow when heated to 290 F. Coatings are removed easily, leave no residue, and the jacket formed can usually be replaced on the tool, if necessary, after inspection.

Complete tool sets ready for storage are examined for correct code numbers. When missing, the code numbers are etched on the tools at one of the two positions shown. In the racks at the right are tool sets ready for delivery to the shop.

Glass-Fabric Jig Devised For Drilling Contoured Surfaces

BY EDWARD PRONO AND J. M. BUTLER,
CONSOLIDATED VULTEE AIRCRAFT CORPORATION

Structure built-up in 19 layers used instead of metal jig for locating and drilling holes in wing part of experimental airplane

A GLASS-FABRIC structure built-up in 19 layers was developed at the Vultee Field plant of Consolidated Vultee as a jig for locating and drilling 86 holes in the wing junction of an experimental airplane. The aluminum surface to be drilled had a double curvature and it was necessary that all holes be drilled at 90 deg. to the contoured surface. Construction of a metal jig would have been difficult. This resulted in the preparation of a glass-fiber structure, bonded with phenolic resin, 32 percent by weight of glass fabric and 68 percent by weight of phenolformaldehyde, with a thermal coefficient of expansion approximating that of aluminum.

Details of the form on which the jig was built are shown in Fig. 1.

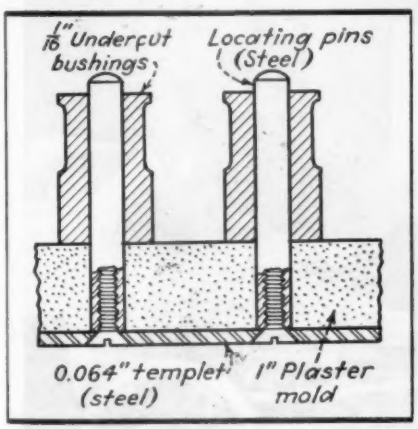


Fig. 1—A steel templet is bent to the desired contour and is fitted with steel locating pins held in place with countersunk screws. Plaster is poured around the pins and drill bushings are set on them

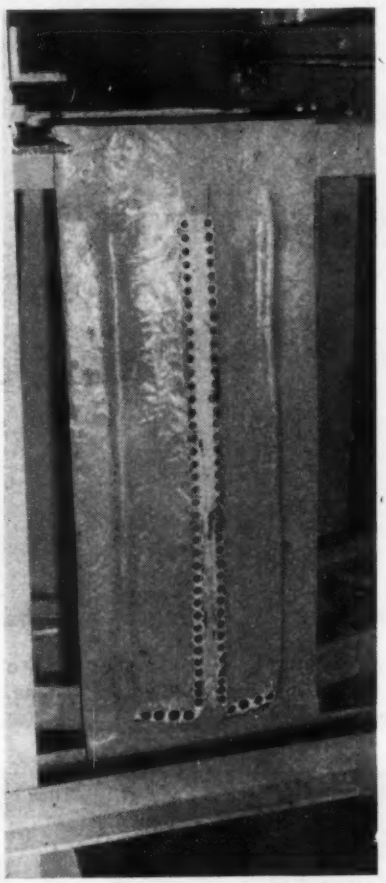


Fig. 3—Installation of completed glass-fabric jig in master jig

A templet of 0.064 in. steel was bent to the desired skin contour, the holes with diameters of 0.500 and 0.750 in. located, and steel locating pins attached by countersunk screws on the under side. The steel locating pins were coated with vaseline and a 1-in. layer of plaster poured around them, smoothed and allowed to set. The plaster surface was given five coats of a cellulose-nitrate lacquer to seal it and to serve in separating the plaster from the jig.

Hexagonal bushings, Fig. 2, with undercuts to provide anchorage, were placed on the locating pins and the jig built around them on the plaster form. Heated in an air oven for 30 min. at 400 F., to decompose the lubricant and give better bonding to the resin, 19 layers of Fiberglas cloth ECC-142 were built-up. Each layer was impregnated with a catalysed phenolformaldehyde resin. Bubbles were worked out by hand. The resin used was Baker No. 102078, mixed with one part of No. 102052 catalyst in five-pound batches. Each batch was used up before another was mixed to keep the mixture fluid. Strips of Fiberglas tape EC-11A were laid along and between each bushing to insure bonding. A ¾-in. rope was laid on each side, between layers ten and eleven, for added rigidity. The complete assembly was then cured for 96 hr. at 180 F. in an oven, to set and dry the resin and thus prevent after-shrinking.

Upon cooling, the assembly was removed from the mock-up frame, the edges trimmed, the screws holding the pins removed and the pins knocked through the underside. The jig was then separated from the plaster and mounted in place on the master wing assembly jig.

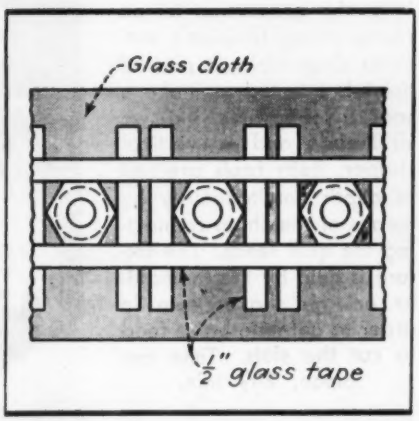
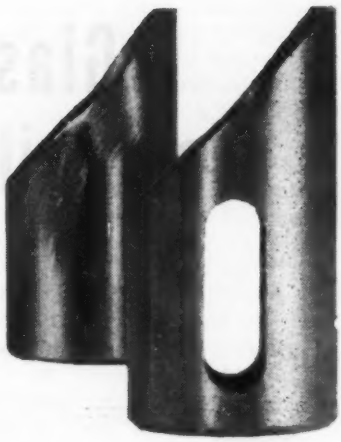
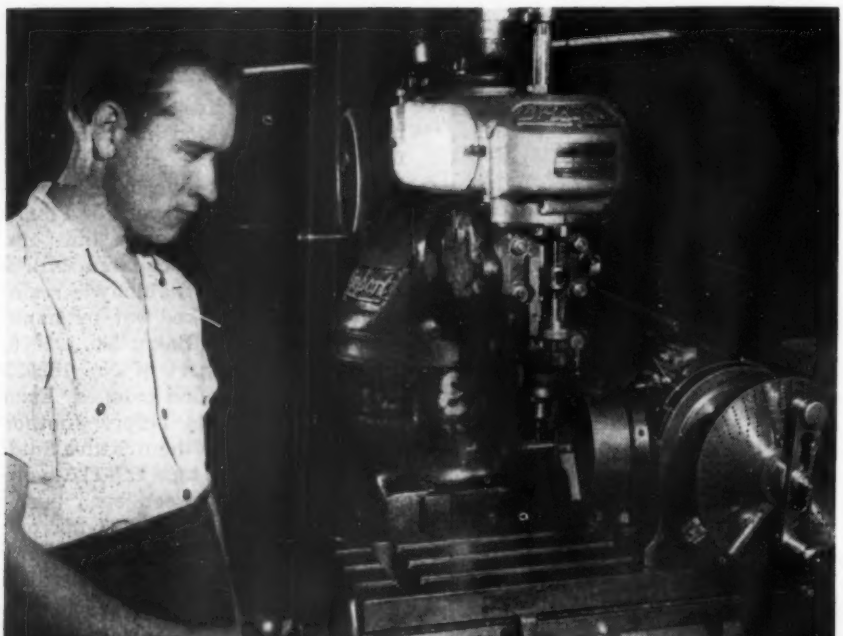


Fig. 2—Layers of glass fabric coated with plastic are built-up on the plaster form. Strips of glass tape are used to reinforce the bushings

5 WAYS TO CUT A SLOT



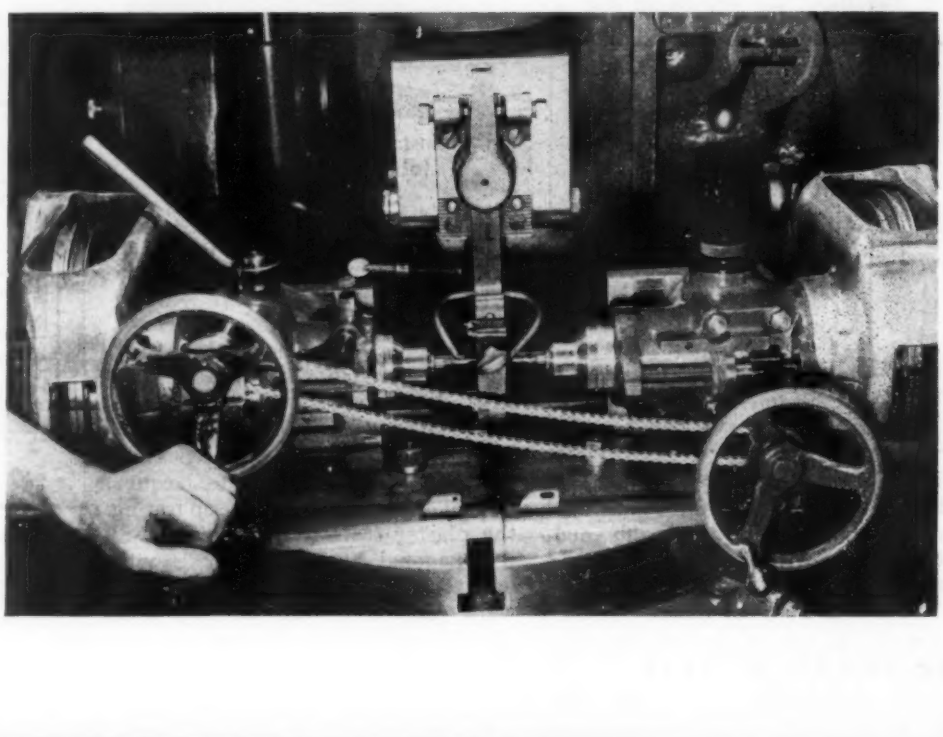
THE JOB: to mill two slots 1/2 in. long in opposite sides of a cam follower made of 3/4-in. O.D. tubing



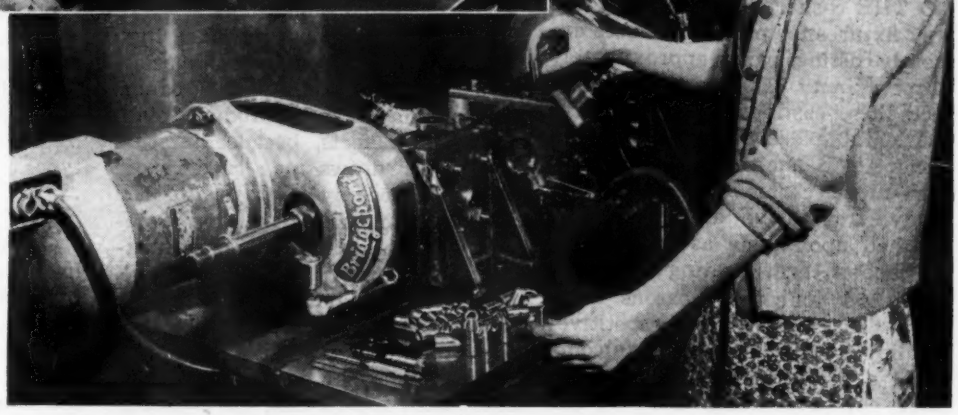
FIRST SET-UP: When quantities were small, Plant 1's machine shop used a hand mill and dividing head to mill one slot in the cam follower at a time. Time per piece, 6 min.

RIVALRY between two machine shops at the Glenn L. Martin Company, Baltimore has reduced the time for cutting two slots in a follower cam from 6 min. to 50 sec. The follower cam is used in conjunction with engine-hood cowlings. Before the part became an important production item, the machine shop in Plant 1 set up a dividing head on a hand mill for milling one slot at a time. As greatly increased production became necessary, the machine shop in Martin's Army Division also took part in making the follower cam. So a race began to see which shop could cut the slots in the least time and with minimum use of critical machinery, expensive tooling and labor. Eventually, five different set-ups for slotting the cam had been created.

SECOND SET-UP: With the production tempo rising, Army Division's machine shop took on part of the job, elected to make a special set-up involving two drillheads and a vertical shaper. Both tools are fed to depth simultaneously by means of the chain connecting the quill feeds. The fixture is held by the toolholder on the shaper ram in order to get lengthwise feed to cut the slots. Time per piece, 2 1/2 min.



THIRD SET-UP:
Plant 1 figured that a precision boring machine would be better for its share of the production load, because the machine itself was not as critical as a shaper and a less expensive fixture could be used. Time per piece, 1 min., 45 sec.



FOURTH SET-UP:
Supervisors at the Army Division figured they could beat Plant No. 1's time by salvaging the drillheads from the shaper set-up and developing a special cam slotter. An unskilled operator merely feeds a blank into the resultant $1,250 automatic cam miller, catches the slotted part. Time per piece, 41 sec.

FIFTH SET-UP:
Plant No. 1 saw possibilities in a newly acquired double-end centering machine, built a fixture for $7.50. Result—a sturdy cam miller that can be run by a woman after ½ hr. training, and is not balky when fed an oversize or undersize part. Time per piece, 50 sec.

Tray Improvements Brought About By Wartime Use of Pusher Furnaces

BY JOSEPH SAMMON, CHIEF FOUNDRY ENGINEER, THE DRIVER-HARRIS COMPANY

Better quality of heat-treated work and a programmed method of work loading are advantages of trays and tray fixtures designed specifically for the conditions in a given plant

TO THE casual observer, trays and tray fixtures for pusher furnaces are merely castings worth approximately $1 per pound. But as a matter of fact, these castings are the fruit of considerable design effort plus experience in melting and pouring high nickel-chromium alloys. Certainly, trays have as much effort lavished upon them as adjuncts of the modern heat-treating furnace.

This is so for several reasons. First of all, the field is highly competitive; no alloy foundry can expect to command a better price for a complicated, expensive design than for one that is simple, economical to purchase and economical to use. Second, the life of the casting is intimately associated with "know how" in melting and pouring the alloy. An experienced foundry can produce trays with a long service life, but one not familiar with the art may turn out products that will last only a few days. Third, only by broad experience can one predict the best type of design to withstand heating and cooling cycles or the effects of carburizing. Fourth, by close association with many users, the tray designer learns various methods of obtaining efficient "tools" whereby the heat-treater can get the maximum use out of his equipment.

The first consideration in design of a tray is the alloy. Experience has shown that the suitable range of alloy content is rather limited. When the analysis falls outside this range, in order to permit pouring an unusual design, the life of the tray is sacrificed. In any event, delicate adjustment of alloy content must be made to suit the application. For example, an alloy that will withstand repeated quenching may not have sufficient rigidity at elevated temperatures. On the other hand, an analysis that does possess adequate rigidity may fail early as the result of cracking. Only experience can tell one which material will give the longest service life under a specific set of conditions.

Melting and pouring the high nickel-chromium alloys is a specialized branch of the foundry trade. The castings must be produced with minimum defects, because internal shrinks or draws may cause rapid failure, especially in trays intended for gas carburizing. And if the design is such that molding, core-making or cleaning time are excessive, the casting can not be produced at a reasonable price. Patterns are thus important. A tray user is unlikely to save money by designing his own equipment and turning the drawings over to the ordinary pattern shop. If he were to place the job with eight different shops he would get eight different patterns, and none of them would agree in respect to the problems of molding and coring alloy castings intended for high-temperature work. It is far better to give the complete job—tray design, pattern making and casting—to an experienced alloy foundry as the following example will show.

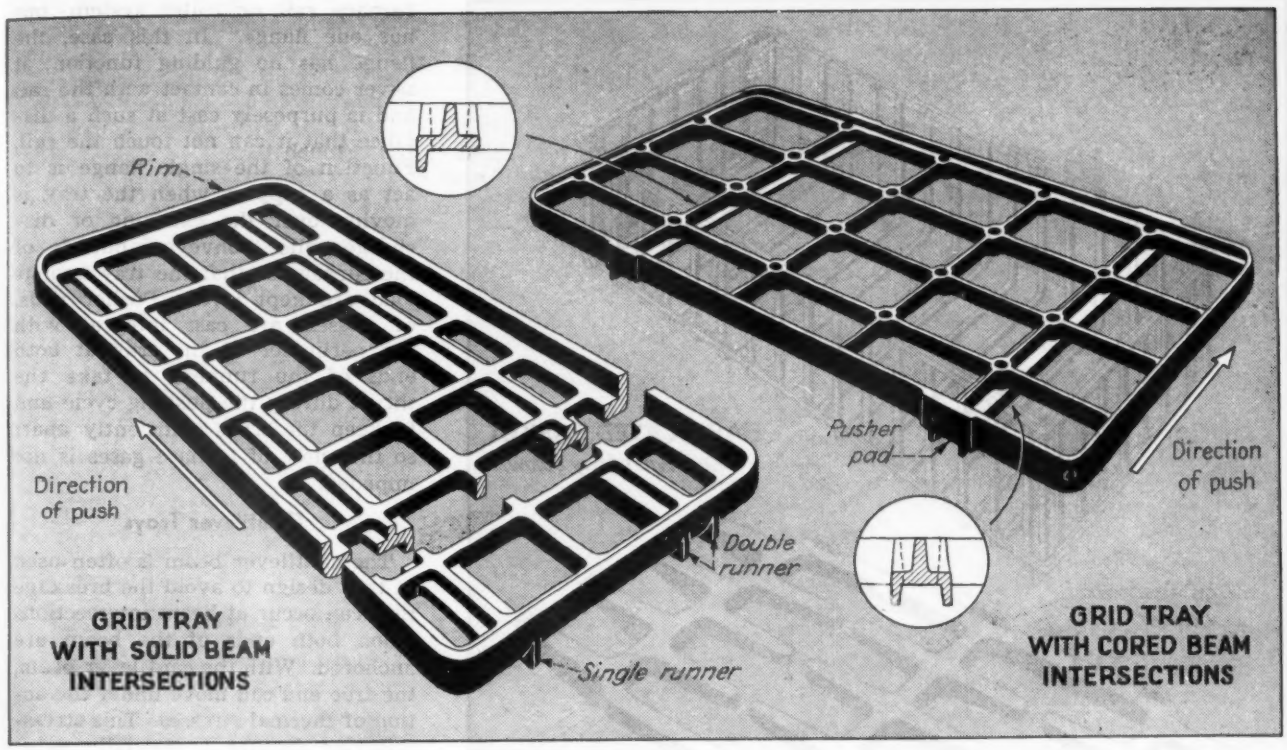
A metal-working concern that had had some experience with pusher trays set out to design equipment for a certain job. Analysis of the drawings revealed that the castings alone would cost $2,000 and that $3,000 worth of machining would be necessary. By a redesign that took into account the tricks of the trade and avoided machining altogether, the trays were turned out for $800.

So with adequate experience as a background, it is not difficult to work out a tray design that takes into account all of the factors involved. One important aspect of this work is to provide equipment possessing maximum utility and flexibility. A good program will provide trays that heat-treat the workpieces in the proper manner and permit full use of the rated capacity of the furnaces. Trays of several kinds may be suggested so that different jobs can flow through the furnace at the same time. Or trays may be designed so that the components of a device, say an engine, are heat-treated in sets. The possibilities of modern pusher-furnace trays and fixtures are suggested by the following details of several types.

Grid Trays

Of the several types of trays used in pusher furnaces, the grid tray is by far the most common. It is practically a universal tray, in that it can be used in so many ways: (1) with a sheet liner to support a carburizing box, (2) alone to transport castings and forgings that will not fall through the openings, (3) with a perforated cast liner to support articles that will fall through the tray openings, and (4) to support fixtures on which certain classes of work must be transported through the furnace.

The grid tray has practically superseded the solid bottom tray. The reason is not hard to find. It is practically impossible uniformly to heat a continuous thick section of a good heat-resisting alloy to a temperature of 2,000 F. Stresses are set up in the solid bottom tray because of unequal heating of the bottom and top surfaces, and thus early failure may be expected. The grid tray, on the other hand, permits the hot furnace gases to reach all portions of the interlocking beams forming the tray bottom and more uniform heating of the load also



Grid trays have proved better than solid-bottom trays for general heat-treating operations, because the furnace atmosphere can reach all parts of the tray and work, thereby achieving more uniform temperatures

results. When carburizing is done, the box rests on a sheet liner of ⅛ or 3/16 in. thickness, and the liner permits rapid heat transfer to the charge. It is not uncommon for a grid tray to give 100 times the service rendered by an equivalent solid-bottom tray.

The proportioning of the members of a grid tray is primarily the function of an expert in casting heat-resistant alloys. Sufficient metal must be incorporated in the beams to span the rails and support the load without sagging under load while at furnace heat. The effects of the thrust of the pusher mechanism must be taken into account. And beam cross-section and type of beam intersection are of great importance in determining tray life.

Furnace-chamber dimensions and span of the rails are fixed quantities. Some people prefer to push the tray cross-wise; others want a lengthwise push. With these matters in mind, plus the operating temperature and maximum loading expected on the tray, the designer proportions the beams and selects the type of beam intersection considered most suitable.

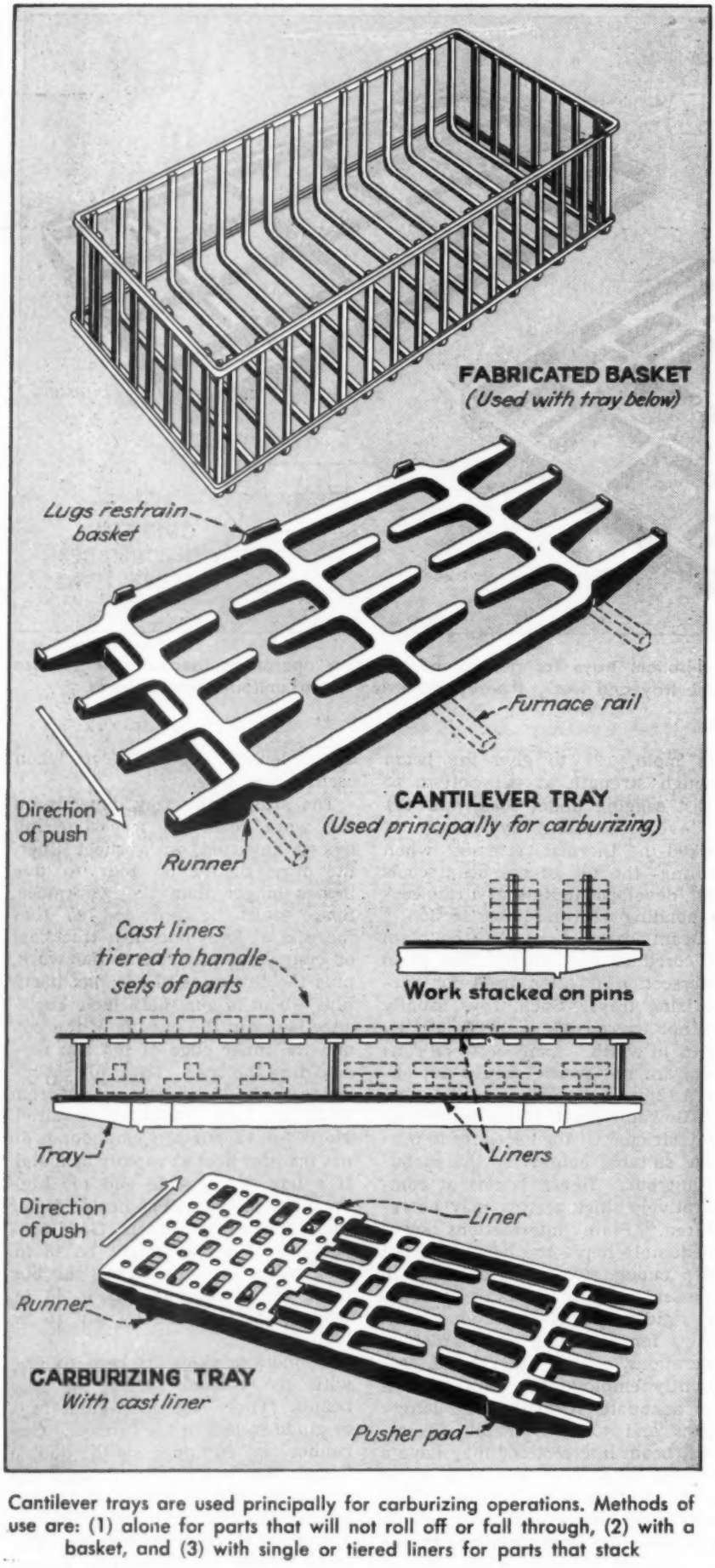
Grid beams are customarily tapered, being thinner at the top than at the bottom. This construction serves these purposes: (1) to simplify removal of the pattern from the mold, (2) to give the beam enough strength at the bottom to resist sagging under load, and (3) to avoid buckling by reason of locked-in thermal stresses when cooling—the top of the beam cools first, develops strength at a rate corresponding with the lower section.

Beam intersections may be plain or cored at the center. The plain intersection is often used for carburizing trays. Such trays usually do not exceed 48 in. in length by 14 in. in width. Spans between runners are not great (should not exceed 12 in. if possible).

Allowable depth of the beams may be restricted by the necessity to provide suitable height for the carburizing box. Hence beams of comparatively thick section may be required. Plain intersections serve adequately here—the beams are not deep enough for possible locked-in stresses to cause breakage because of rigidity at beam intersections. Trays for annealing and hardening operations, on the other hand, frequently employ deep thin sections for adequate strength over longer spans and to save metal. Therefore, beam intersections may have a tapered cored hole which is larger at the top than at the bottom. Thus, when the beams cool the tapered hole can close in slightly and thereby equalize stresses in the beams. The hole also avoids defects when casting the tray.

The size of the tray depends on the work load. If a carburizing box is inverted on a sheet liner, the tray should be four to five inches longer than the workpiece. Space must be provided so that there is at least one inch thickness of compound all around the work, plus the thickness of the box itself, plus about a one-half inch clearance between the outside of the box and the inner edge of the rim surrounding the tray. Thus, for carburizing shafts 18 in. long, a tray from 22-23 in. long would be required. Moreover, carburizing compounds do not transfer heat as rapidly as metal. If a box is too wide and too high the outer pieces will be heated faster than those in the center. Good proportions of a tray might be 48 in. long by 14 in. wide. Thus the box itself would measure about 46 in. long by 12 in. wide by say 15 in. high.

Runners or skids are cast integral with the bottom surface of tray beams. These ride upon guide rails or guide rollers in the furnace. One runner is equipped with double flanges that are a loose fit over the one guide rail or string of rollers, to keep the tray in alignment during movement through the furnace. The other runner rests upon the second



Cantilever trays are used principally for carburizing operations. Methods of use are: (1) alone for parts that will not roll off or fall through, (2) with a basket, and (3) with single or tiered liners for parts that stack

furnace rail or roller system, but has one flange. In this case, the flange has no guiding function; it never comes in contact with the rail and is purposely cast at such a distance that it can not touch the rail. Function of the single flange is to act as a support when the tray is moving over the charging or discharge roller conveyors outside of the furnace so that the tray and its load are kept level. Pusher pads, or bosses, are cast integral with the perimeter of the tray at both ends of the runners, to take the thrust during the pushing cycle and to keep the trays sufficiently apart so that flow of furnace gases is not impeded.

Cantilever Trays

The cantilever beam is often used in tray design to avoid the breakage that can occur at beam intersections when both ends of the beam are anchored. With the cantilever beam, the free end can move under the action of thermal stresses. This stress-relieving feature is specially valuable in the case of trays subjected to severe service, as in carburizing. Moreover, casting defects are less troublesome with the cantilever-tray design. Contours can be made smooth, thus avoiding carbon penetration in crevices, a phenomenon which has sufficient force to split a casting if the carbon build-up proceeds far enough.

Several varieties of cantilever trays have met the test of service conditions. In one installation, the tray beams are made comparatively heavy to support large workpieces directly on the tray surface. The same trays can also be used to transport heavy loads of smaller pieces placed in a cast basket. Lugs at one side of the tray prevent movement of the basket during the pushing cycle. Thus one tray serves to transport both large and small pieces.

A cast liner is often a valuable adjunct to a cantilever tray. Small work can be supported directly on the liner, or stacked on pins. In one case, the liner was provided with bosses on one side. This side of the liner was placed down on tray, and pins about 9 to 10 in. long were inserted vertically into the cored bosses. Then small gears were stacked on the pins. Rectangular cored holes in the tray surface permit adequate flow of carburizing gas through the charge.

A third type of cantilever tray permits an ordinary box furnace to be loaded and unloaded as efficiently

as a car type. Roller-rails were placed in the furnace, which was 50-60 in. deep. The tray has runners that engage the furnace roller rails. An integral eye at one end of the casting permits the tray to be pushed into or pulled out of the furnace with a hooked bar.

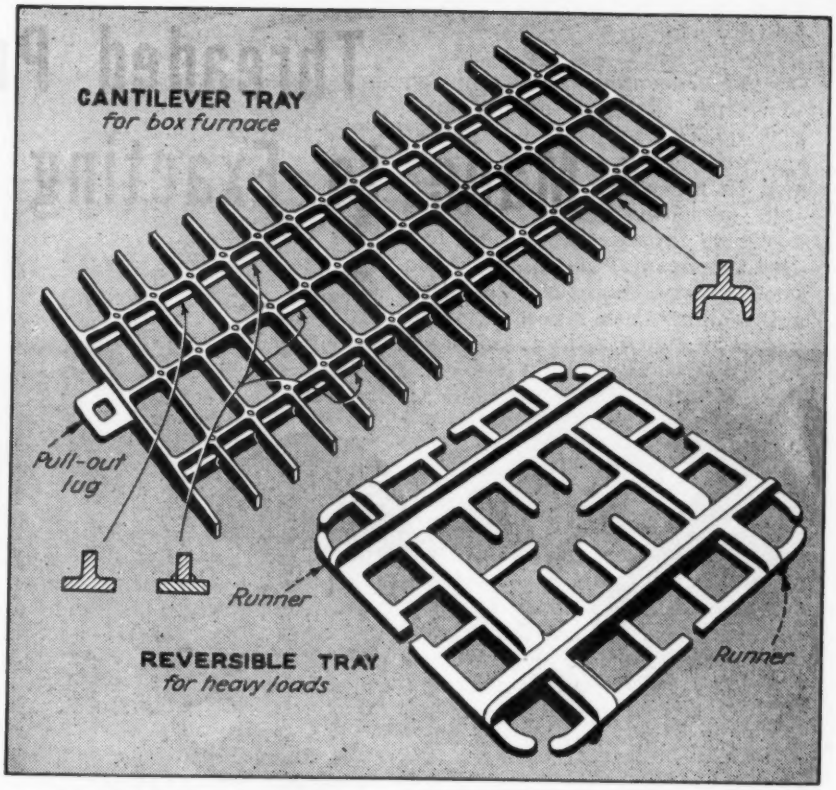
A fourth type of cantilever tray, intended for heavy loading, is reversible. The reversible feature is obtained by casting one set of runners at right angles to the second set of runners on the opposite side of the tray. The two sets of runners act as sturdy beams to support heavy loads of forgings stacked on the tray. If sagging occurs after the tray is in use for say a week, the tray can be turned over and the probability is that a flat surface will be restored by the combination of heavy load and heat.

Circular Opening Trays

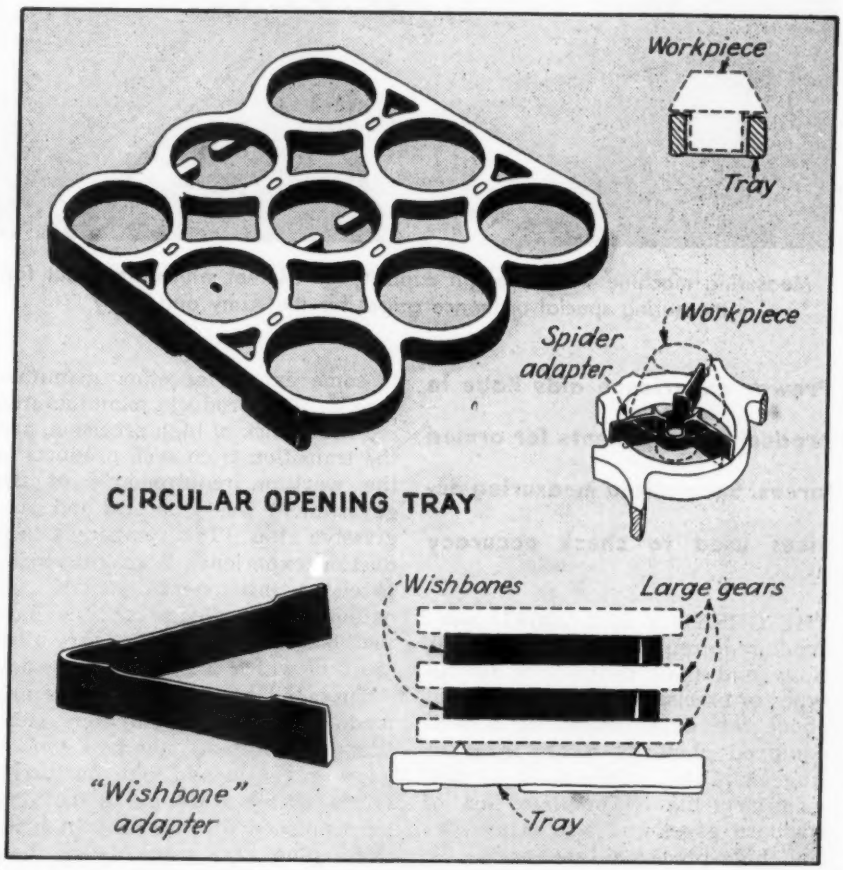
Cast trays with circular openings provide a convenient means of carburizing gear blanks, gears with shaft extensions or pieces of similar shape that can be laid flat or stood on end safely. Such trays keep the workpieces the proper distance apart, make maximum use of furnace chamber capacity, promote greater production because they insure orderly loading.

One design of circular-opening tray can be used to process a variety of pieces. For example, a manufacturer was producing a large bevel gear with a short, large-diameter shaft extension. A tray suitable for his furnace was made up with nine circular openings. The bevel gears are laid flat on the tray surface, being supported by knife edges to reduce contact, and the short shaft extension protrudes down through the opening to prevent lateral shifting of the workpiece during the pushing cycle. When flat gear blanks on large diameter are being processed, a V-shaped casting, or adapter, is placed on the tray and the part is laid on the adapter. By use of several of these "wishbone" adapters, the gears can be stacked as high as the furnace door will permit. A third part, which is shaped like a tapered roll with shaft extension, is accommodated by a cast spider adapter that is centered on the tray opening. Thus, with the aid of adapters, the one tray is used to heat-treat three types of pieces, either in batches or in sets of parts, as may be required.

The second installment on trays for pusher furnaces will be published in an early number.

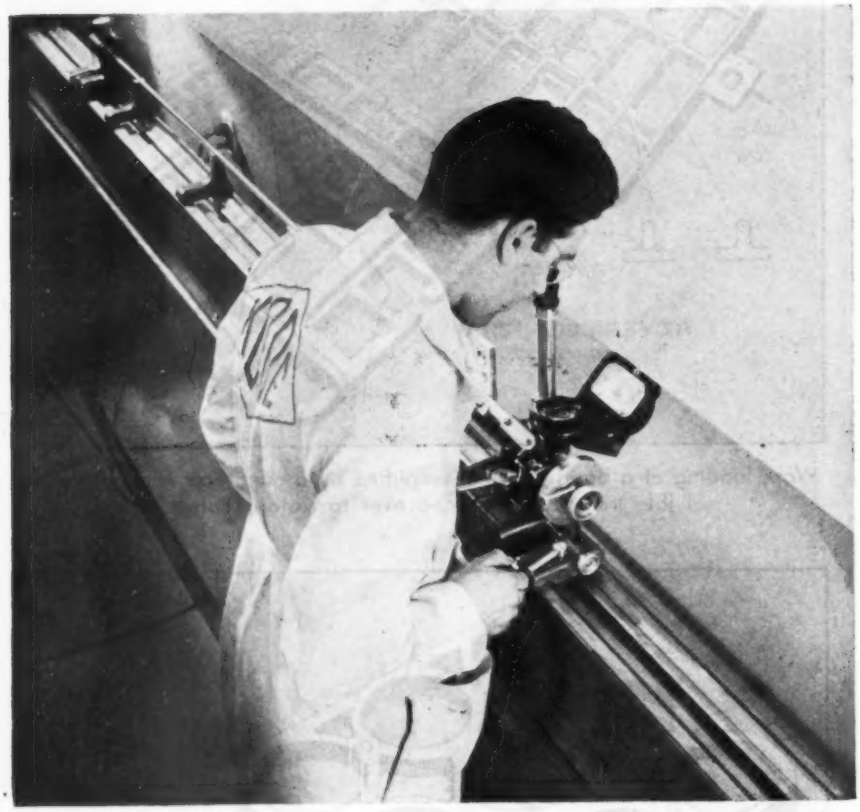


Work loading of a box furnace is simplified by a cantilever tray. A reversible tray can be turned over to restore flatness



Gears are handled with circular-opening trays and adapters. Upper right—bevel gear supported by tray. Right center—spider adapter holds a part with small shaft. Lower right—the "wishbones" have knife edges

Threaded Precision Gages Made to Exacting Specifications



Measuring machine with a length capacity of 14 feet which was built for measuring special ordnance gages for the Army and Navy

Prewar experience aids Kobe in producing instruments for armed forces. Specialized measuring devices used to check accuracy

THE GREATLY ENLARGED wartime requirements of the Army, Navy and their contractors for all types of precision gages has brought about the development of a well equipped plant by Kobe, Inc., Los Angeles, Calif. This plant is now manufacturing a complete line of standard gages and also many special, high-precision types.

Prior to the outbreak of war this company manufactured hydraulic systems for pumping oil wells and also built gages for its own use and to some extent for other manufacturers. The products manufactured required work of high precision, and the transition from such products to the wartime requirements of the government was a natural and progressive step. The company's production experience in making high-precision instruments included an extensive knowledge of the best methods for machining the alloy steels of which the gages are made.

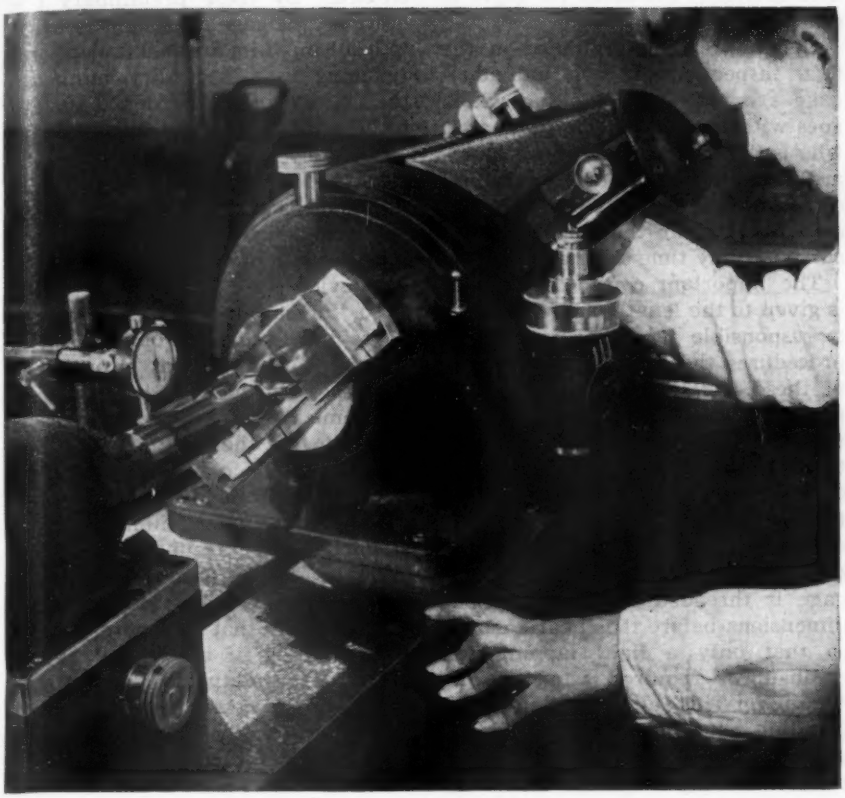
Threaded plug gages are usually made from SAE 52100 alloy steel. Blanks for various standard sizes of gages are roughed out on turret lathes within 0.010 in. to 0.015 in. over finished dimensions. In making a plug gage from one of these blanks, the first step is to mark it. Identification markings are made by steel stamping unless the gage is one of thin section which might be damaged by the impact of stamping, in which case it is marked by pantographic engraving or by etching. Etching is used if the gage is to be marked after it has been heat-treated.

After the blank has been marked, it is hardened, using an oil quench, to 60-62 Rockwell C scale and aged. The aging process, to promote structural stabilization of the steel, alternately heats and cools the blank. The larger the blank, the greater the number of times it passes through this heating-cooling cycle. This process effectively checks the "growth" of the steel.

Before machining, centers of the gage blank are precision lapped on a lapping machine for accurate holding in subsequent operations. The blank is then ground cylindrically to a diameter about 0.003 in. greater than the ultimate major diameter of the finished threads of the gage, thus leaving sufficient material for the final finish grinding of that diameter. The gage body is threaded on a thread grinder, the pitch diameter being finished from 0.0003 in. to 0.0005 in. over basic size.

Each operator uses supermicrometers to check his own work and is responsible for it meeting prescribed tolerances. Women operators perform much of the grinding inspection, and measurement work. Aptitude is an important qualification for men and women operators.

When the threading is completed, the first and last threads of the plug gage are convoluted on a special machine devised by Kobe. The threaded gage is clamped horizontally, at right angles to the grinding wheel, in a clamping fixture which is so made that the operator can revolve the gage around its longitudinal axis through at least one complete revolution. A finger is then engaged in the thread of the gage body. When the gage is revolved in the clamping fixture the consequent horizontal movement of the driven finger actuates a movable worktable, feeding the gage against the grinding wheel. Since the gage itself becomes, in ef-



A Vinco optical dividing head is used for angular measurements. Much of the inspection work is done by women who are proficient in the handling of delicate instruments

fect, the leadscrew, this machine is universal and can be used to convolute any number of threads of any diameter up to its maximum capacity of 6 in.

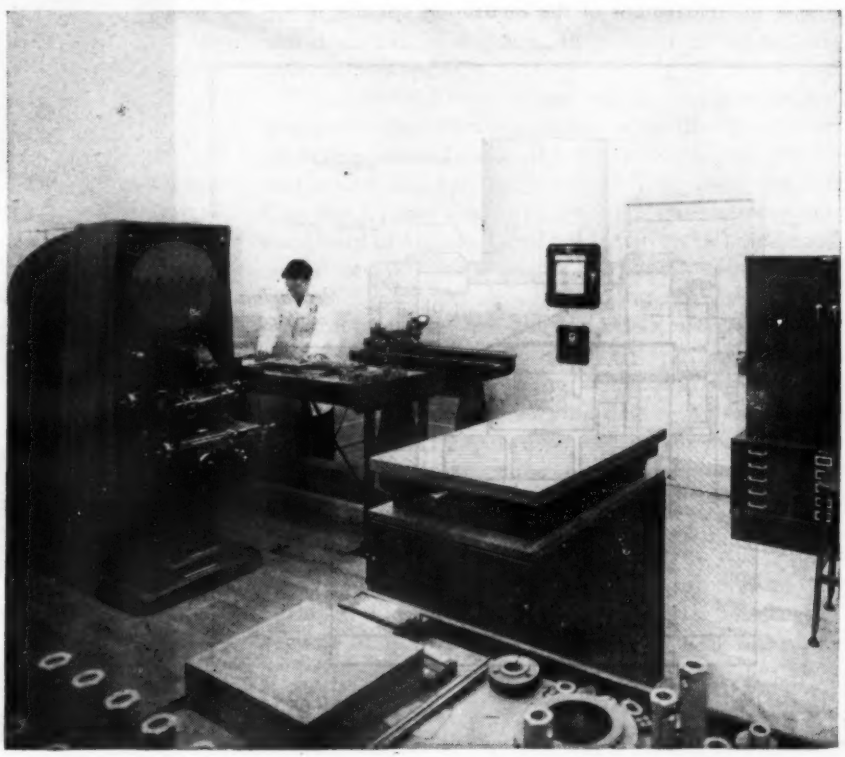
Lapping is done in two stages: First a specially graded diamond, or an optical lapping compound is used; and second, finish lapping is done with crystals of sapphire, extremely small in size, but of exact crystalline form. The gage is held and driven by a reversible two-speed, motor-driven chuck. As the gage revolves, a threaded lap, charged with compound, is held by the operator so that it engages and moves along and over the threads of the gage.

Lapping has the effect of rounding the crests of the threads slightly. It was to overcome this rounding that the body of the gage blank was left some 0.003 in. oversize in diameter when it was cylindrically ground. Cylindrical grinding is again used to reduce the major diameter of the thread to its final size. Tool marks from this final grinding operation are removed by a light lapping with a cylindrical lap, and the completed plug gage is then ready for final inspection.

The inspection laboratory is equipped with mechanical and optical measuring equipment of extremely high accuracy. Air-conditioned rooms used for the shop work of the gage department surround the laboratory, which has its own independent air-conditioning system for accurate control of atmospheric conditions. Temperature variations in the surrounding shop rooms do not exceed 2 deg., while within the laboratory the variations are not more than 1/10 deg. Relative humidity in the laboratory is maintained at a value of 40 to 45 percent, and dust is removed from the air entering the room through a bank of three filters and an electrostatic precipitator.

Measuring equipment includes two Pratt & Whitney machines, 36 in. capacity, whose smallest reading is 1/100,000 in. One machine is fitted with a special type of electrical measuring head. In this device, the difference between the electrical currents induced in two similar coil circuits is read in terms of the amount of movement of the measuring spindle of the machine. Movement of the spindle causes the two currents to differ. To accomplish this, a portion of the iron core that is common to the two coils is attached to the spindle. When the spindle is moved, the displacement of the movable portion of the core causes a proportionate inverse variation in the output current of the two coils. These two currents are rectified and opposed, and it is the resultant current that is measured

The laboratory, or final inspection room, which has an independent air-conditioning system whereby temperature variations are controlled within 1/10 deg. and the humidity at 40 or 45 percent



rather than the absolute value of either, so that fluctuations in the source voltage do not affect the accuracy of the measurement which is read directly from a sensitive ammeter.

A third measuring machine of the same type, but with a length capacity of 14 ft. has been built to handle special ordnance gages built for the Army and Navy. Other measuring equipment includes a Vinco optical dividing head which reads to 1 sec. of arc, a Bausch & Lomb optical comparator, and six sets of gage blocks. Only four of these six sets of gage blocks are used as working instruments, the other two sets, whose surfaces have never been engaged, are used as controls for the working sets. Two sets of blocks are needed for control use as these master sets are sent to the Bureau of Standards periodically for recalibration.

When the completed thread plug gage arrives at the laboratory for final inspection it is cleaned with a volatile solvent and then examined on the measuring machine for roundness, taper and dimensions of its pitch and major diameters. The lead of the thread and the flank angles are checked on the optical comparator. Similar inspections and measurements are made for gages of other types.

Definite readings obtained in the final inspection of each individual gage are recorded on a tag which goes with the gage to the purchaser, who is thereby provided with a record of the actual size of his gage and can determine accurately the amount of wear that has been incurred at any time during its life.

The important consideration that is given to the length of life of gages is responsible for other interesting procedures that are followed. One of these is the use of Nitralloy, a material well suited for gages because of the extreme hardness obtainable and its low distortion properties. Although Nitralloy is used for gages of all types, it is most commonly used for ring thread gages. With this material, the ring gage is threaded blank to finished dimensions before it is heat-treated, so that only a light lapping for clean-up is required after the nitriding. This eliminates a finish grinding operation after hardening, and maintains the thin, hard outer coat, which greatly increases the wear-resisting quality of the gage.

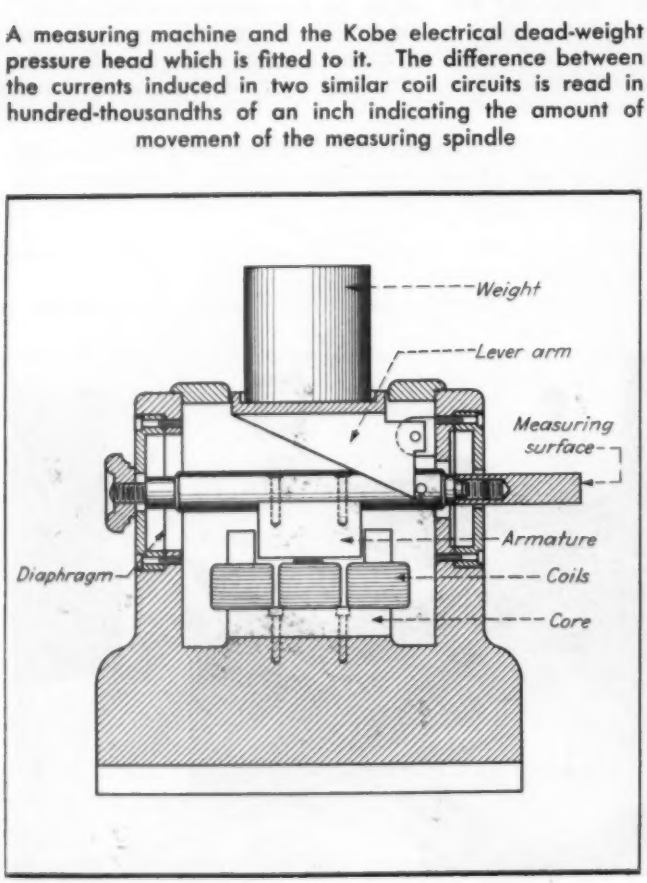
If a threaded plug gage is made of Nitralloy, it is pre-threaded and pre-convoluted before being heat-treated. By these preliminary operations, the gage is brought to within 0.001 in. of its finished dimensions, reducing to a necessary minimum the amount of the hardened surface to be removed in final finishing.

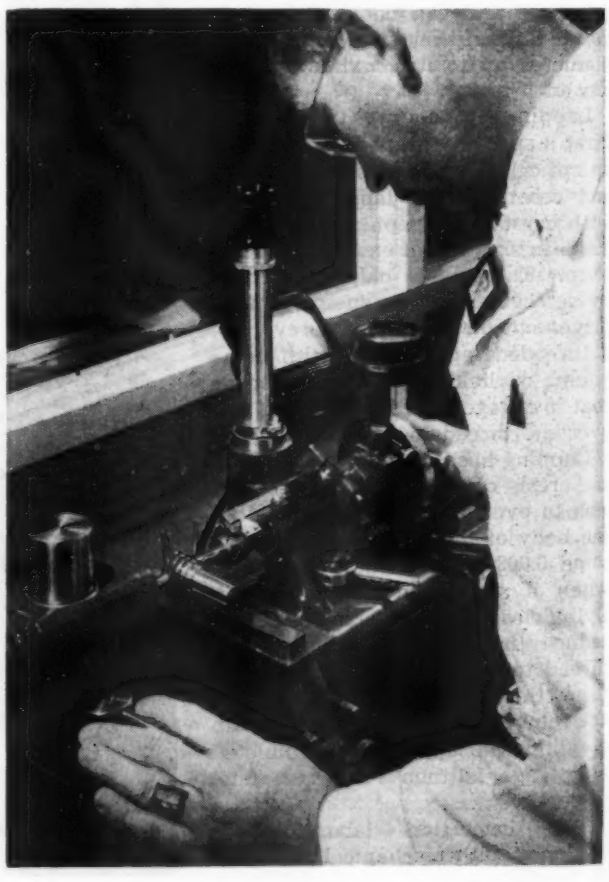
Nitralloy gages are hardened in electric furnaces having special tanks. This equipment was installed and used before the war for nitriding certain parts of the hydraulic pumping device.

To further increase the life of gages they are electroplated, when desired, by a special proprietary process. The mechanical and electrochemical features of this process are such that the thickness and uniformity of the plating coat are accurately controlled. The process deposits a film of chromium plating of a thickness of from 0.0003 in. to 0.0005 in. on the entire surface of a gage, including those that have been threaded, so that no more than a light lapping, if any at all, is required after plating. Finish grinding made necessary by the uneven deposition of other plating methods particularly on threaded gages, is avoided.

A reinforced thermoplastic handle is used on plug gages, which prevents transfer of body heat from hand, improving accuracy of gages.

A measuring machine and the Kobe electrical dead-weight pressure head which is fitted to it. The difference between the currents induced in two similar coil circuits is read in hundred-thousandths of an inch indicating the amount of movement of the measuring spindle





WHAT DOES AMERICA WANT?

IT IS THE PURPOSE of this editorial, the thirty-first of a series, to state the urgent need for a clear declaration of American policy in world affairs.

Within the past few weeks there has been a wakening conviction in this country that the determination of international arrangements cannot safely be put aside until victory has been won. For we have seen actions taken in Europe seemingly without full consultation and agreement of the Allied powers, which may profoundly affect the design of the post-war world.

A declaration of American policy is needed, and it should be accompanied by a statement of our firm intention to exert full effort to procure its acceptance and furtherance. Emphatically, this does not mean that an American platform should be put forth as an ultimatum, which other nations must accept totally, or reject at the cost of having the United States withdraw from collaborative participation in world agreements and organization. On the contrary, the first plank in such an American platform should be a firm commitment on our part to participate with our associate nations in building a general system of world security and order. By definition, this requires that each participant be willing to accommodate its purely national interests to a program that can be accepted as fairly representing the interests of all. But equally, there is imposed on each participant an obligation to state honestly and openly what it conceives its individual interest to be, as well as its concept of what measures will best serve the general interest.

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Americans have displayed a singular diffidence in the matter of formulating a bill of American objectives—singular, in that it contrasts so sharply with our power to exercise as broad a leadership as we are able to define. This reluctance stems partly from the inherent difficulty of arriving at a coherent statement of national aims in a country like the United States—so vast in area, so multiple in its sectional and group interests, and so soundly committed to the free expression of individual thought. But it stems also, in part, from a tradition of national isolation which, however understandable in historic perspective, now stands clearly discredited by two world wars which were not of our making, but from which we were unable to hold aloof.

That the economic wellbeing and political security of the rest of the world is closely bound to the decision and performance of the United States is questioned nowhere but in America. Political boundaries and restrictions cannot build effective fences against the interplay of economic forces, and the sheer weight of American economic influence is of crucial import to all the other nations of this globe. In large measure their decisions will be shaped either in response to the opportunities that our procedures offer them, or in defense of interests that our procedures may jeopardize.

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The United States contains only about 6 percent of the world's population. But—our national income, before the war, amounted to almost 25 percent of world income; our industrial output as a whole approximates 45 percent of world totals, and we now are producing a like percentage of the world's munitions; we have 35 percent of the world's railroad mileage; 25 percent of merchant fleet tonnage; 50 percent of the world's telephones; 45 percent of steel production; 40 percent of aluminum production; 33 percent of coal output; we are refining (though part of the production comes from imports) 55 percent of the world's copper, and 70 percent of its petroleum; we now are producing 50 percent of the world's rubber (though post-war resumption of natural rubber production will sharply reduce this balance); our shares of agricultural production are, of course, much smaller, but just before the war we accounted for 35 percent of world cotton production, 15 percent of wheat, and 10 percent of wool.

Whether we like it or not, we must exercise political responsibilities commensurate with the weight of our economic power in an inter-dependent world. But before responsibilities can be assumed, they must be defined. Can the United States arrive at a clear agreement and statement of aims for which it is willing to stand sponsor?

The recent campaigns of both political parties have helped to provide an encouraging answer. In general, election mandates are glaringly deficient as indicators of a unified national purpose. A majority of voters declare themselves for the winning candidate. But even among the majority there are varying degrees of enthusiasm for the platform principles espoused by their candidate; and the substantial minorities of the defeated parties may have had no enthusiasm whatsoever for particular planks in the winning platform, or for the platform in its entirety. A sportsmanlike deference to the will of the majority is a feeble substitute for unified national conviction.

But this Presidential campaign was noteworthy for certain basic principles upon which both the platforms and the candidates of the major political parties were

united. Surely, upon such areas of agreement there may be said to have been an American mandate; the more so, because upon certain of them, we have evidence that no party or candidate could have declared opposition with any hope of victory. What then were these agreed-upon principles? The following is an attempt at a fair summary:

1. That America, in collaboration with its Allies, is committed to seeing the war through to the unconditional surrender of our declared enemies.

2. That America is committed to a responsible role in a world security system after the war, including a commitment to lend the support of our armed forces to repel aggressions that may violate such security.

3. That America is committed to the post-war goal of substantially maintaining in this country an economy that will provide jobs for those who are able and willing to work.

4. That America is committed to the principle of achieving this goal of sustained, high-level employment of manpower and economic resources under a system primarily activated by competitive enterprise.

These are American mandates. They can be made the nucleus of a coherent national policy, for they define aims upon which the great majority of our people are emphatically agreed. But no one can pretend that in this generalized form they serve as more than directional guides for either internal legislation or international negotiation. This skeleton of aims must be clothed with the living flesh of agreed-upon means. Here we have no national mandates of comparable clarity, but it is patently clear that it is our compelling task to achieve them.

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On our elected representatives in government rests the primary responsibility for formulating the specific programs required to implement national policies. Under our system of government, those representatives need continuous nourishment in the form of mandates as to what the people want. Particularly during a period when so many urgent problems are being thrashed out upon an international basis, this imposes a grave responsibility upon all sectors of our citizens; for it requires them to think in terms of the welfare of our nation as a whole, to focus upon those points which offer possibilities for substantial agreement among Americans, rather than upon matters of individual, group, or sectional advantage.

In earlier editorials I have tried to define a basis for national policy in keeping with that broad purpose. They have dealt with problems that are basic to the healthy functioning of free enterprise under the competitive system, with the mobilization of our resources for war and for reconversion to peace-time production, with labor and management responsibilities and relations, with national debt and taxation, with foreign trade and our economic relationships abroad, with the industrial development of backward areas. Since they have been presented in the McGraw-Hill publications, which reach a group broadly representative of all American industry, they have centered upon problems that have an economic rather than a strictly political import.

Future editorials, to appear during 1945, will deal with comparable subjects selected in recognition of the urgent importance for arriving at concerted definitions of national policy. I am fully aware that no individual or group can speak authoritatively for the American Nation. But I hope that an honest attempt to formulate sound concepts of national interest in crucial economic matters will help to crystallize American policy both by focusing agreement and by eliciting dissent.

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Here there is space only to indicate in broadest outline what I conceive to be desirable foundations for an economic policy for the United States:

1. The attainment of a high and sustained level of business activity and employment in the United States and in the world.

2. Active and expanding markets for world trade based upon fair competition rather than upon bloc agreements, discriminatory preferences, and cartel arrangements.

3. The encouragement of industrial development in nations that have been backward in that respect.

4. A recognition that hospitality to imports, rather than constituting a threat to national standards of living, offers in fact the most potent instrument for international bargaining that any nation can command.

5. A willingness to assume a responsible national role in international arrangements designed to provide such financial stability as may be needed to support mutually advantageous world exchange of goods and services.

We must see to it that the end of military warfare does not merely open the door to an era of economic warfare.

The fact is that America has no choice but to assume leadership in world affairs. For the weight of our influence will be felt by other nations no less whether our attitude be positive or negative. And the cost to us of any international obligation which we might undertake must in all fairness be weighed against the equally real cost to us of dealing with measures that others may take to protect themselves against the results of our non-participation.

We have tended in the past to approach international commitments timidly, fearful that we might be outwitted in a world battle of wits. And in so doing, we have too often ceded to others the initiative of suggestion, leaving to ourselves the thankless task of accepting or rejecting what they demand of us.

Our one bargaining weakness stems from the fact that other nations, by contrast feeble in potential power, know what they want and are able to mobilize all their strength to achieve it.

America can be the most effective nation on earth — if only it knows what it wants.

President McGraw-Hill Publishing Co., Inc.

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Direction of Cut Affects Forces in Milling

BY M. MARTELLOTTI, RESEARCH ENGINEER, CINCINNATI MILLING MACHINE COMPANY

5—The hand of the helix and the hand of the cut have a direct effect on design of milling fixtures

FORCES ACTING near and along the cutting edge of a milling cutter tooth and the chip being formed can be assumed to be represented by a force normal to the face of the tooth, and a frictional force acting along the face of the tooth opposing the flow of the chip. The resultant of these is the force required to form the chip.

In helical milling cutters, for example, the relative position of these forces with their respective assumed magnitudes as indicated by the length of lines representing them is approximately as shown in Fig. 14. A simliar analysis can be used for other types of cutters. The intensity of these forces depends on the position of the tooth in the cut, on the kind of material being cut, the cutting material, the thickness of the chip, the method of milling employed, the type of cutter used, the cutting speed, the rake angle, the smoothness of the tooth surface and the kind of cutting fluid employed.

These forces form a system of equal and opposite forces in equilibrium applied both to the cutter tooth and to the chip and consequently to the workpiece. The force N_C applied to the chip is equal but opposite to the force N_T applied to the tooth and likewise, the frictional force F_C applied to the chip is equal but opposite to the force F_T applied to the tooth. These forces can be combined in equal and opposite resultants R_C and R_T. These resultants can be resolved in component forces along chosen directions as illustrated in Fig. 14.

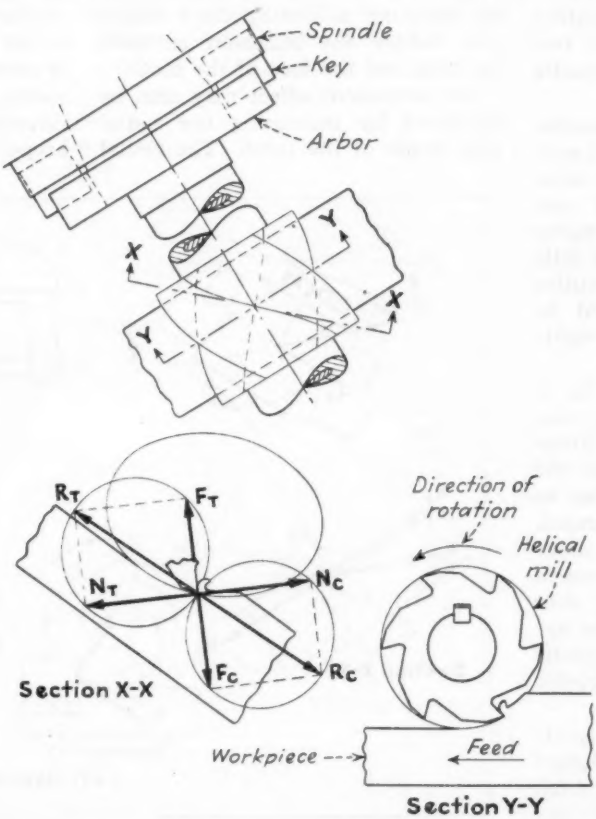


Fig. 14 — Forces produced in milling with a helical mill

The effect of the forces N_T and F_T on the cutter can be more easily analyzed by resolving R_T in three components A_T, S_T and T, applied to the cutting edge of a tooth and respectively parallel to the axis (axial component A_T), the radius (radial component S_T) and the tangent (tangential Component T_T) of the cutter as shown in Fig. 15.

Depending on the *hand of helix* and the *hand of cut*, the component A_T tends to press the cutter against or to pull it away from the spindle, and to deflect it and its mounting either toward or away from the work. This will change the dimensions of the cut taken by the cutter.

In milling cutters having *right-hand helix* and set-up for *right-hand cut*, as shown in Fig. 15, the axial component A_T tends to pull the cutter and the arbor away from the spindle and the work. The same results are obtained with a cutter having *left-hand helix* and mounted for *left-hand cut*.

If a cutter with *left-hand helix* is mounted for *right-hand cut* (Fig. 16), or a cutter with *right-hand helix*

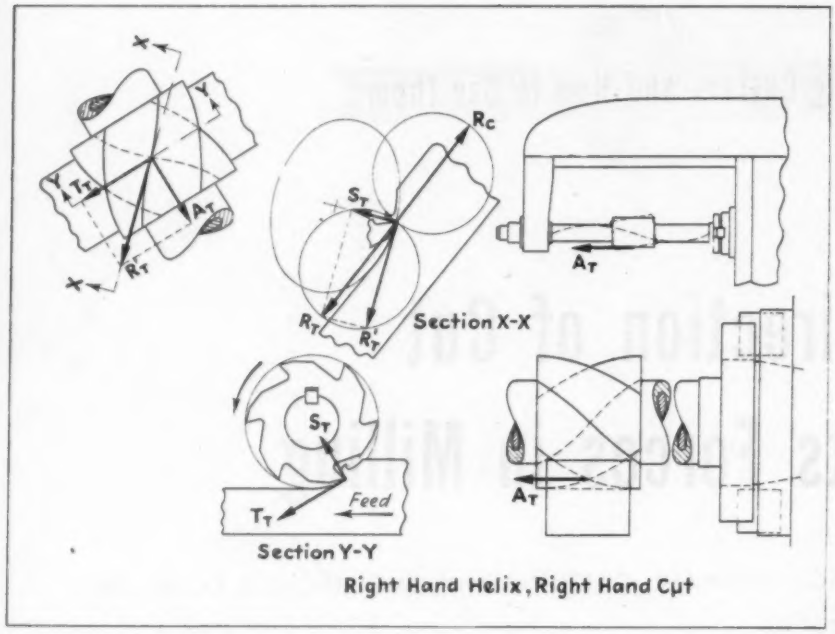


Fig. 15—Forces on a milling cutter having a right-hand helix and taking a right-hand cut

is mounted for *left-hand cut*, the component A_T will press the cutter and the arbor against the spindle helping to hold the cutter and arbor in position and providing a more rigid set-up. The force A_T also deflects the cutter toward the work causing it to take a deeper cut than intended.

The component A_T can be neutralized by mounting on the arbor, two cutters having helices of opposite hands. (Fig. 17).

As a general rule it is preferable to mount a single-arbor helical milling cutter so that the hand of helix is opposite to the hand of cut, namely: a milling cutter with *right-hand helix* should be set up for *left-hand cut* and conversely a cutter with a *left-hand helix* should be mounted on the arbor for *right-hand cut*.

The tangential component T_T is always directed to oppose the rotation of the cutter. It twists the arbor and cutter and generally bends the arbor so as to cause the cutter to take a heavier cut than intended, as it would be the cause in the above examples. It is the only component of the resultant force which does work and determines the torque applied both to cutter and spindle drive and consequently the power required in the cut.

The radial component S_T is usually in such a direction as to deflect the cutter and the arbor away from the workpiece; under certain circumstances, however, its direction may be such as to urge the cutter into the cut (S_T). This condition is obtained if the depth of cut is great, the positive rake angle is large, or if the intensity of the frictional force is reduced for example, from the value F_C to F^1_C, (as indicated in Fig. 18), while the normal force N_C is assumed to remain constant. The frictional force F_C may be reduced by applying a cutting fluid which will reduce the adhesion between the chip and the face of the tooth.

An equivalent effect may also be produced by increasing the radial rake angle of the tooth. The radial rake angle is the angle made by the tooth face with the cutter radius and it may be either positive or negative. With a *large positive radial rake angle* (Fig. 19), the radial component S^1_T is directed toward the work, thus producing a similar effect as the reduction in the intensity of the frictional forces.

With a *negative radial rake angle* however, the radial force S_T usually deflects the cutter away from the work, even with a small frictional force, as in the case shown in Fig. 20.

Forces on the Workpiece

The action of the resultant force R_C on the workpiece can be analyzed to better advantage by resolving it in a horizontal component H parallel to the table of the machine (supporting the workpiece) in the direction of the feed; a vertical component V at rigth angles to the table, and the axial component A_C parallel to the axis of the cutter and at right angles to the direction of the feed (Fig. 21). The axial component applied to the work is equal to and opposite in direction to the axial component applied to the cutter, already discussed in the foregoing.

As indicated in Figs. 15 and 16, the hand of the helix and the hand of the cut determine the direction of the axial component. When this is not neutralized by a combination of cutters having helices of opposite hands, it will force the work to move sidewise if not held in position by proper clamping means.

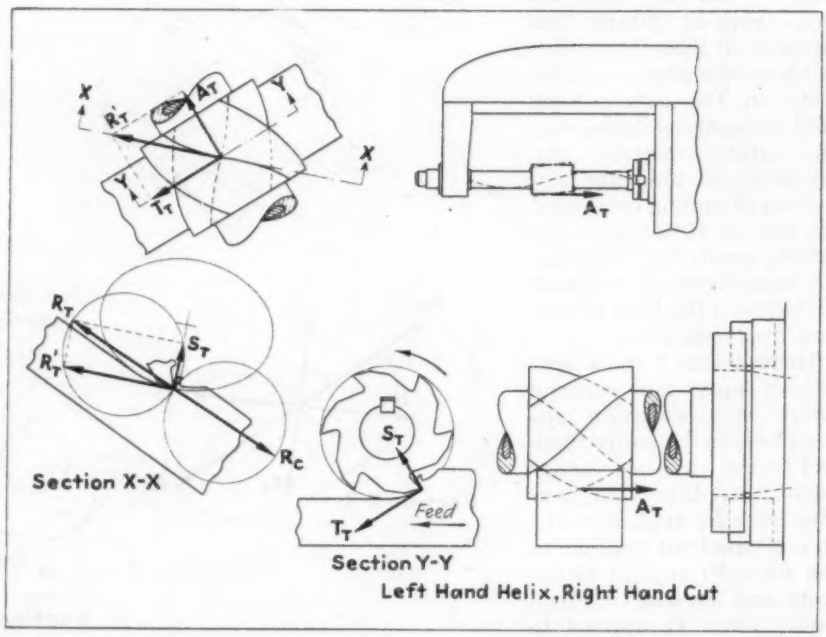


Fig. 16—Forces on a milling cutter having a left-hand helix and taking a right-hand cut

In the method known as *up milling*, the direction of cutter rotation is opposite to the direction of table feed and the horizontal component H (Fig. 21) urges the workpiece to move away from the cutter in the *direction opposite to the feed.* Its intensity determines the load in the feeding mechanism and the power required to maintain the table and the workpiece moving at the predetermined feed rate.

In the method of milling known as *down milling* (Fig. 22), in which the cutter rotates in the *same direction as the work-feed,* the horizontal component H urges the workpiece and the table in the direction of the feed. If the motion of the table and the workpiece is not positively controlled, the workpiece may be drawn into the cutter and thus an unusual increase in the intensity of the cutting force will result. This may damage the cutter and work. It is, therefore, necessary to hold the workpiece securely on the table and to eliminate lost motion in the table feeding mechanism. Since the horizontal component acts in the direction of feed, it reduces the power required to feed the table against the cutter.

The vertical component V of the resultant R_C is directed vertically either upward, tending to lift the work from the table or downward, pressing it onto the table. In *up milling* (Fig. 21), the vertical component is usually directed upward, especially with large positive rake angles, deep cuts and low frictional force on tooth and chip interface. If the radial rake angle is negative, the depth of cut is shallow and the frictional force is high, the vertical component is directed downward thus pressing the work onto the table.

In down milling (Fig. 22), the vertical component V is always directed downward, thus cooperating with the holding device in maintaining the workpiece rigidly clamped to the work table.

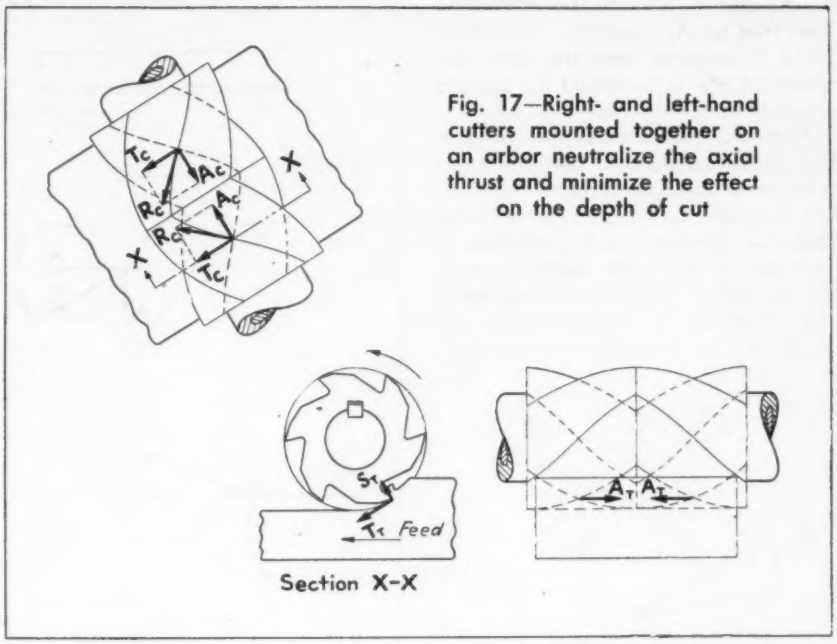


Fig. 17—Right- and left-hand cutters mounted together on an arbor neutralize the axial thrust and minimize the effect on the depth of cut

Effect of Helix Angle

The helix angle affects both the tangential and axial components of the resultant cutting force. In Fig. 23, is shown the conditions obtaining in a peripheral milling cutter for several values of the helix angle and for assumed values of the normal and frictional forces. For a helix angle a, the axial and tangential components have the values indicated by the segments A_a and T_a. By increasing the helix angle to

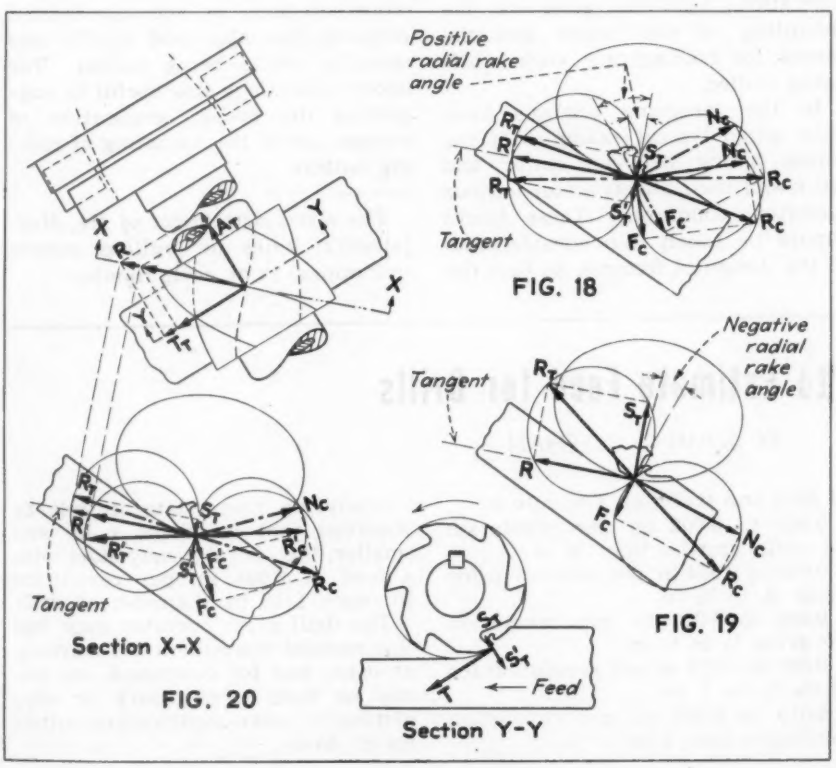


Fig. 18—A directional change in the radial component S_T is produced by a decrease in the intensity of the frictional force F_C

Fig. 19—A directional change in the radial component S is produced by increasing the value of the positive radial rake angle

Fig. 20—Effect of a negative radial rake angle in the intensity of the radial component S_T

a_1, A_a and T_a assume the intensities indicated by A_{a1}, and T_{a1}. The radial force S remains constant since the resultant R_T is assumed to remain constant in either case.

From the condition represented in Fig. 23, it can be seen that the axial component increases and the tangential component decreases as the helix angle is increased, and conversely a decrease in the helix angle reduces the intensity of the axial component and produces a corresponding increase in the tangential component.

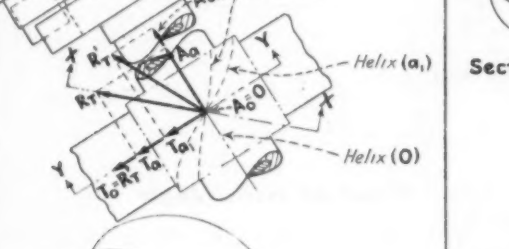
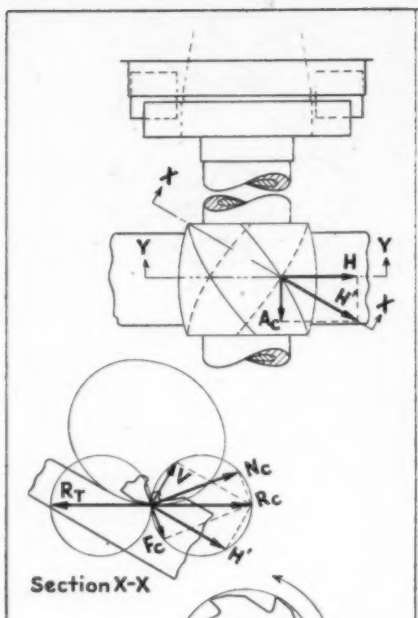


Fig. 23—How the helix angle affects the axial and tangential components of the cutting force

If the helix angle is zero, as in plain milling cutters with straight teeth, the axial component vanishes and the tangential component is equal to R_T. Equivalent effects are produced on the workpiece and proper consideration must be given to the mounting of the cutter and the means for holding the work while being milled.

In the foregoing analysis have been given typical examples of the forces acting between cutter and work and their affects under various operating conditions. These forces should be taken into consideration in the design of fixtures, so that the workpiece may be not only located properly but also held rigidly and securely while being milled. The above analysis is also useful in suggesting the proper application of clamps and in the mounting of milling cutters.

The sixth installment of Mr. Martellotti's series on milling cutters will appear in an early number.



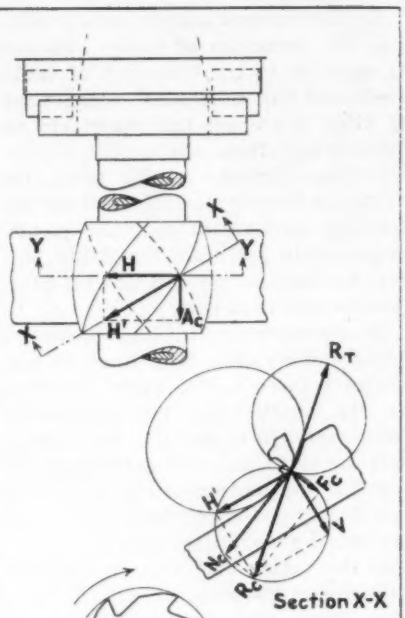


Fig. 21—Showing how the vertical, horizontal and axial components of the cutting forces of a helical cutter apply to the workpiece

Fig. 22—Showing how the vertical, horizontal and axial components of the cutting force apply to the workpiece in "down" milling

How to Estimate Feed for Drills

BY JOHN L. SKEEHAN

AN EASILY REMEMBERED METHOD for estimating drill feeds will be useful to an operator of a drill press, whether the operator is on continuous production or uses a machine occasionally as in a maintenance shop.

In the "Handbook for Drillers," issued by Cleveland Twist Drill Company, data are as follows:

"Starting feed is governed by size of drill and material. The rule is:

0.001 to 0.002 in. per revolution for drills smaller than ⅛ in.

0.002 to 0.004 in. per revolution for drills ⅛ to ¼ in.

0.004 to 0.007 in. per revolution for drills ¼ to ½ in.

0.007 to 0.015 in. per revolution for drills ½ to 1 in.

0.015 to 0.025 in. per revolution for larger than 1 in."

Analyzing these data it will be observed that for drills 1 in. and smaller, the operator may start with a feed of 0.001 in. per revolution for each 1/16 in. diameter of drill.

The drill press operator may find this method convenient for starting, at least, and for continued use unless he finds it necessary or economical to make modifications either up or down.

Incendiary Bombs Machined on Production Lines

CAST MAGNESIUM incendiary bombs have been produced in large quantities by the Pacific Enamel Works of the American Radiator & Standard Sanitary Corporation in a West Coast plant originally set up to make bathtubs. A complete conversion was necessary as the plant had to be almost entirely reequipped. This included the installation of a new magnesium casting department in which the bomb bodies are cast in permanent molds. The cast-iron nose pieces of these bombs are inserted in the molds before the molten magnesium is poured. After the castings are cooled, they go to one of several complete production lines where all necessary machining operations are performed.

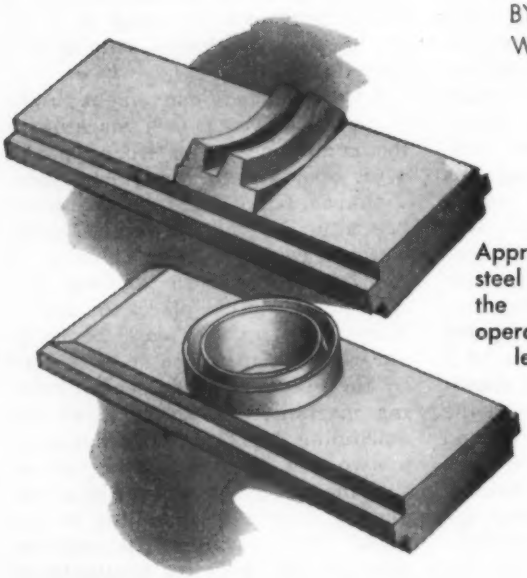
As partially shown in the accompanying illustration, each bomb machining line consists of a punch press for removing fins from the bomb body by pushing it through a hexagonal shaving die, a specially adapted 4-in. spindle drill press which faces the body to length and counterbores one end to receive the firing pin assembly, a punch press for cutting a smaller secondary hexagonal to receive the sheet-steel tail assembly, a special four-spindle drilling machine for three screw holes and one safety plunger hole, a special three-spindle drilling machine for vent holes, and a single-spindle deburring machine that cleans out the burrs left in the bore of the bomb by the drilling operations. Each of the three and four spindle drilling machines for screw holes and vent holes consists of a frame on which are mounted standard Atlas drill press heads with the spindles spaced horizontally around a locating jig above which is supported an air cylinder for holding the bombs in position during the drilling operation. Each horizontal drilling spindle is fed by an individual air cylinder. These cylinders are connected to a manifold having an operating valve that is opened after the clamping cylinder has been actuated. The entire operation of loading, clamping and drilling a bomb and then removing it from the jig is a matter of only a few seconds.

A work bench of convenient height is placed between each machine in the bomb lines. The second punch press operator, for example, places a shaved bomb body on the work bench to his right where it easily can be secured by the operator of the first four-spindle drilling machine. She, in turn, places the drilled bomb body on the work bench to her right, from which it is secured by the operator of the second drilling machine, and so on down the machining line. These benches serve a two-fold purpose. They insure that the work is positioned at a convenient height for handling to and from each machine. In addition, they provide space for accumulating bomb bodies should some machine on the line be shut down for a short time. Thus, the idle machine does not interfere with production on others in the line.

Steel-topped work benches placed between each machine in this magnesium bomb production line make it easy to move the bomb bodies from one operation to the next. The two drilling machines shown were made up by assembling standard Atlas drill heads around special work-holding fixtures. Air cylinders are used to clamp the work and feed the drilling spindles

Well Designed Fixtures Speed Machining of Gun Mount Parts

BY J. B. MILLER,
WORKS MANAGER, LINK-BELT ORDNANCE COMPANY



Approximately 37 lb. of steel must be removed in the various machining operations to finish this leveling-jack rack

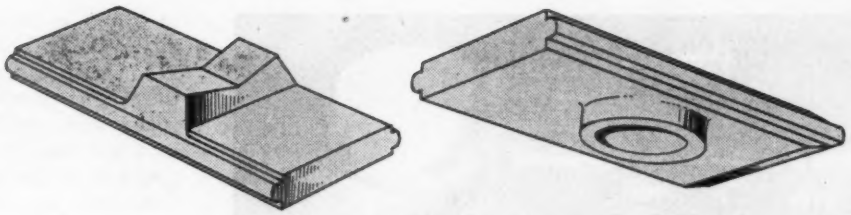
Set-up time reduced by 75 to 80 percent through tooling which positions parts accurately and holds them rigidly for machining

Each side of the tooth boss and the top surface of the rack forging are milled in this set-up on a No. 5 Reed-Prentice miller

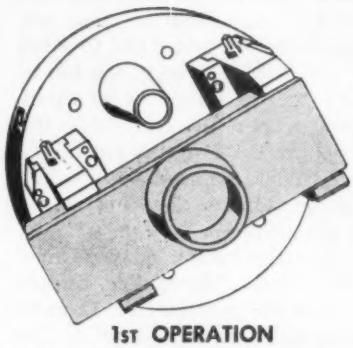
TWO-TOOTH RACKS for the leveling jacks on 90-mm. anti-aircraft gun mounts are machined from SAE 4140 steel forgings. When delivered to the machine shop, these forgings have a hardness of 250 to 300 Brinell, and are approximately 20 in. long and 7¼ in. wide. They weigh about 108 lb. When finished they are approximately 19¼ in. long, 6 15/16 in. wide, and weigh about 71 lb. Each two-tooth rack contains a sector of two threads. When finished each rack must be alike and when mounted in a leveling mechanism engages a worm and must function with the least amount of backlash. To obtain this quality on a production basis, the following tools, fixtures and operations are being used:

Careful attention to the design of the fixtures used for machining the two-tooth racks in the plant of the Link-Belt Ordnance Company has made it possible to finish them to required tolerances at a relatively low factory cost. Most fixtures have been designed so they can be set up quickly and accurately by inexperienced machine operators. In addition, they are arranged so work is positioned accurately and held rigidly with the exercise of normal care. It has been estimated that features built into these fixtures to minimize set-up difficulties have eliminated 75 to 80 percent of the set-up time which ordinarily would be allowed for operations of the type used.

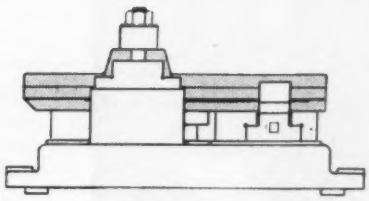
Each fixture has a centering plug, or hardened and ground tongue keys, to locate it properly on the machine tool. In addition, each milling fixture has hardened and ground gage blocks to locate the cutters for each operation. Wherever possible, operations have been engineered so standard cutters can be employed. Carbide-tipped standard tools are used for the



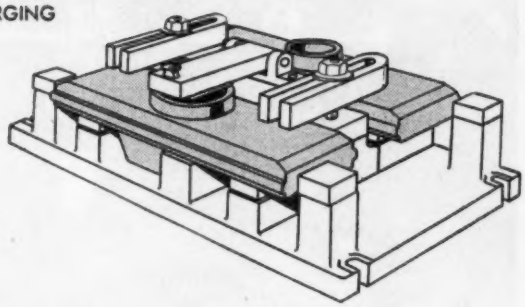
TWO VIEWS OF THE RACK FORGING



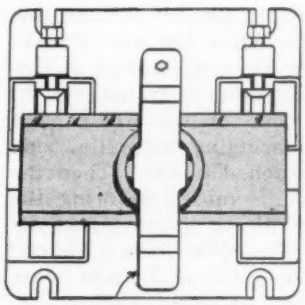
1ST OPERATION
FACE—TURN HUB—BORE—CUT GROOVE



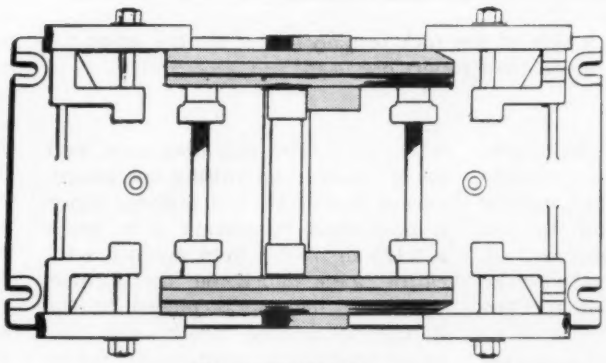
2ND OPERATION
MILL TOOTH SIDE



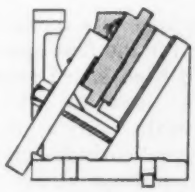
3RD OPERATION
FINISH OVERALL WIDTH



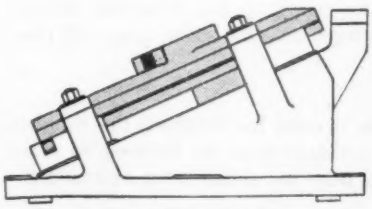
4TH OPERATION
STRADDLE-MILL ENDS



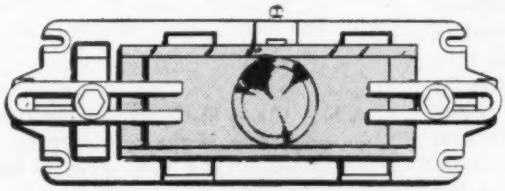
5TH OPERATION
STRADDLE-MILL TONGUE



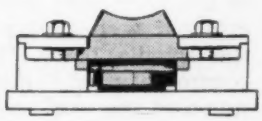
6TH OPERATION
MILL BEVEL ON TEETH



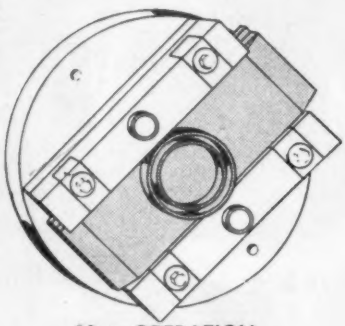
7TH OPERATION
MILL BEVEL ON ONE END



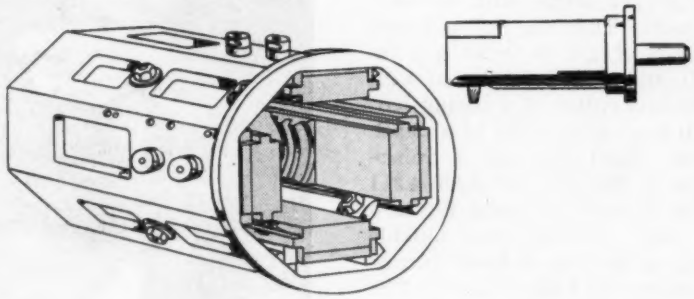
8TH OPERATION
FINISH-GRIND TONGUES



9TH OPERATION
MILL RADIUS AT TOP OF TEETH

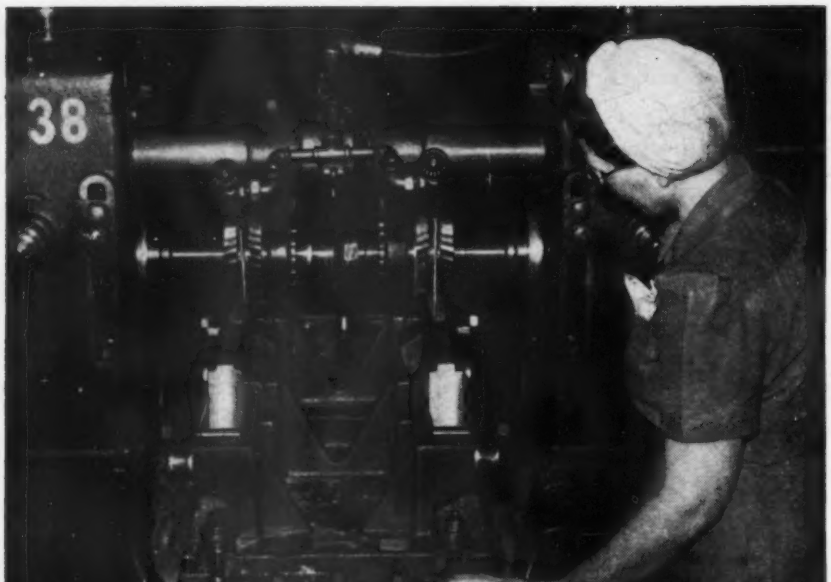


10TH OPERATION
FINISH-GRIND BORE



11TH OPERATION
ROUGH AND FINISH-CUT TEETH

Machining problems have been avoided, and manufacturing time has been minimized, by careful attention to fixture design for each of the operations required on two-tooth racks for leveling jacks used on 90-mm. anti-aircraft gun mounts. Set-ups for the eleven operations are shown here



Tongues are milled on each side of the rack forging in this duplex set-up. High-speed steel cutters are used

various cuts in the turret-lathe set-up for the first operation, and standard high-speed steel milling cutters are used for the second to the seventh operation, inclusive. A special carbide-tipped, negative-rake fly milling cutter is used for the ninth operation.

In the first operation, performed on a No. 1-L Gisholt turret lathe, the rack forging is held in special clamp jaws on a faceplate fixture. This fixture is held to the faceplate of the lathe with four bolts and is centered with a plug that fits into the spindle bore. The fixture is counterbalanced to insure steady rotation of the work. This operation consists of rough-facing the back side of the rack, rough turning the hub, finish facing the back side of the rack and then finish facing the hub for proper height with carbide-tipped tools. Then the hub is bored to a depth of 2¾ in. with a 2 in. end mill, and semi-finish bored with a double-end cutter in a boring bar. The hub next is grooved to a depth of ⅝ in. Then the hub is finish-bored to a diameter of 4.306–4.311 in., using a carbide-tipped bit in a boring bar. Finally, the outside diameter of the hub is finish turned to a diameter of 5.620–5.625 in. The inside and outside diameters of the hub are used to locate the rack for subsequent operations.

The top surfaces at each side of the tooth boss on the top of the rack forging is milled in the second operation on a No. 5 Reed-Prentice vertical miller. For this operation, and for all succeeding milling operations, except the ninth, the milling cutter is positioned by setting it to touch a 0.125 in. feeler held against a locating gage block on the fixture. The rack forging is placed in the fixture with the tooth side up, being located in position by fitting the bore of the boss on the under side over a gage plug incorporated in the base of the fixture. The rack is squared up by moving jaws on each side of the fixture and is held in position with a large clamp across the tooth boss. When setting-up for this operation, the 6 in. diameter 16-tooth high-speed steel milling cutter is fitted into the spindle and then is indicated to insure accuracy of rotation. Two cuts are required for milling the top surfaces of the rack on either side of the tooth boss. These are taken at 20 r.p.m. and 0.075 to 0.110 in. per rev. feed. Finally, the top of the tooth-lock is milled at 20 r.p.m. and 0.297 in. per rev. feed, with the clamp removed. For this cut, a 1⅝ in. gage block is used to position the cutter above the previously milled flat surfaces.

The third operation is performed in a No. 18-36 Milwaukee duplex miller with 3½ in. diameter, 12-tooth shell end mills on each spindle. The fixture employed for this operation holds two forgings. The forging first is located on the left-hand side of the fixture by means of a setting gage fitted into the bore of the finished boss. When the first side of the forging has been milled in this position, the piece is transferred to the other side of the fixture and located by bringing the milled side against hardened blocks. Then the second side is milled to bring the over-all width to the required dimension. For these cuts, the end mills are operated at 7 r.p.m., with a table feed of about 1.47 in. per min. Soluble oil coolant is flooded over the work.

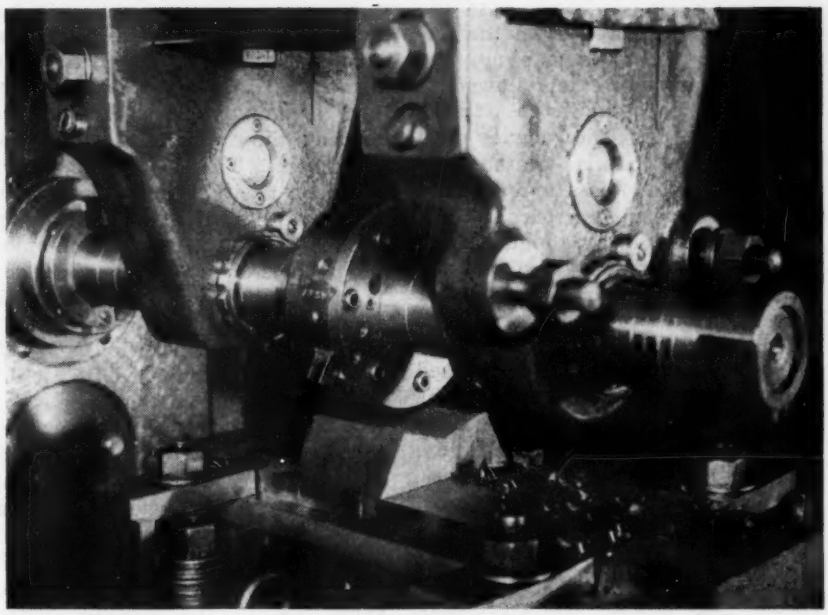
In the fourth operation, the ends of the forgings are straddle milled to length in the same type of ma-

A No. 12x40 in. Thompson surface grinder is used for finishing the tongues on each side of the rack forging. These surfaces must be finished to close tolerances since they serve to locate the part for subsequent operations

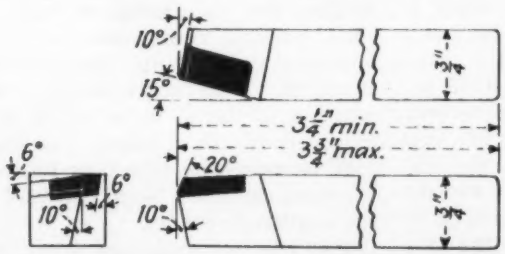
chine as used for the preceding operation. The same size cutters, and the same speed and feed are employed. The fixture for this operation holds only one piece. A setting gage insures proper location of the forgings in the clamp jaws. A No. 18-36 Milwaukee duplex miller also is used for the fifth operation, which consists of straddle milling the tongues on each side of the rack forging. The fixture employed holds two pieces, so one forging is finished in each cycle. The forging first is clamped in the left-hand side for milling one of the tongues, then it is transferred to the right-hand side of the fixture for milling the tongue on the other side. High-speed steel cutters 6½ in. in diameter with 26 teeth are used at 20 r.p.m. with 1.8 in. per min. table feed. Again, soluble-oil coolant is flooded over the work during the milling operation.

A 31-deg., 15-min., angle fixture is used for milling the bevel on each side of the tooth boss in the sixth operation. A 6-in. diameter, 16-tooth high-speed steel end mill is used in a No. 5 Reed-Prentice vertical miller for this operation. The rack is held in position on the fixture with two clamps. First, the piece is milled on one side, then it is reversed in the fixture and a cut is taken across the other side of the piece. For this operation the cutter is rotated at 20 r.p.m. and the table feed is 0.155 in. per rev. Depth of cut is approximately ¼ in. and the cut is about 3½ in. long. A similar fixture is employed for milling the bevels on the end of the rack in the seventh operation. One type of rack requires a bevel on one end only, while another rack has a bevel milled on each end. Four clamps hold the rack in this fixture. The set-up for the seventh operation is essentially the same as for the sixth operation, with the same cutter, feed and speed being employed.

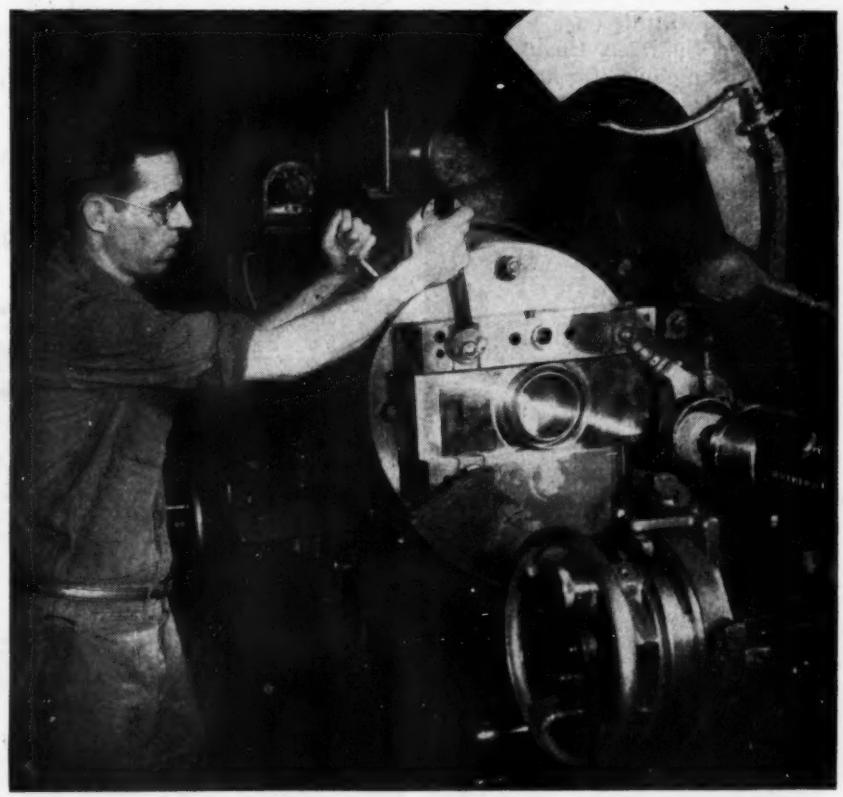
The tongues on each side of the forgings are finish ground in the eighth operation. This fixture is checked with an indicator after it is mounted on the table of a heavy-duty Thompson surface grinder to insure that the rests are level and that they are set in proper alignment with the wheel. Care must be used, also, that the forging is not sprung out of shape when clamped in the fixture. The operator first rough and finish grinds the side of the rack and the side of the tongue on one side of the piece, and then moves the wheel spindle to bring the wheel to the other side of the piece. After both sides have been finish ground,



A carbide-tipped fly cutter with negative rake is used for milling the radius at the top of the tooth boss on the rack forging. Three cuts are taken



This carbide-tipped bit is used in the fly cutter. It is mounted in a 5⅞ in. diameter cutter body arranged so that the bit can be located accurately to cut the required radius of the work



The bore in the back side of the rack is rough and finish ground to precision limits in a No. 72-A Heald internal grinder

the rack is turned over in the fixture, with the tooth side up, and the same procedure is followed to finish grind the tongues to a thickness of 0.749 in. The tongues must be ground within a tolerance of 0.001 in. for thickness and of 0.002 in. on the dimension across the forging at the bases of the tongues. Two diamond wheel dressers are mounted on the table of the machine, one for dressing the outside diameter of the wheel and the other for the sides.

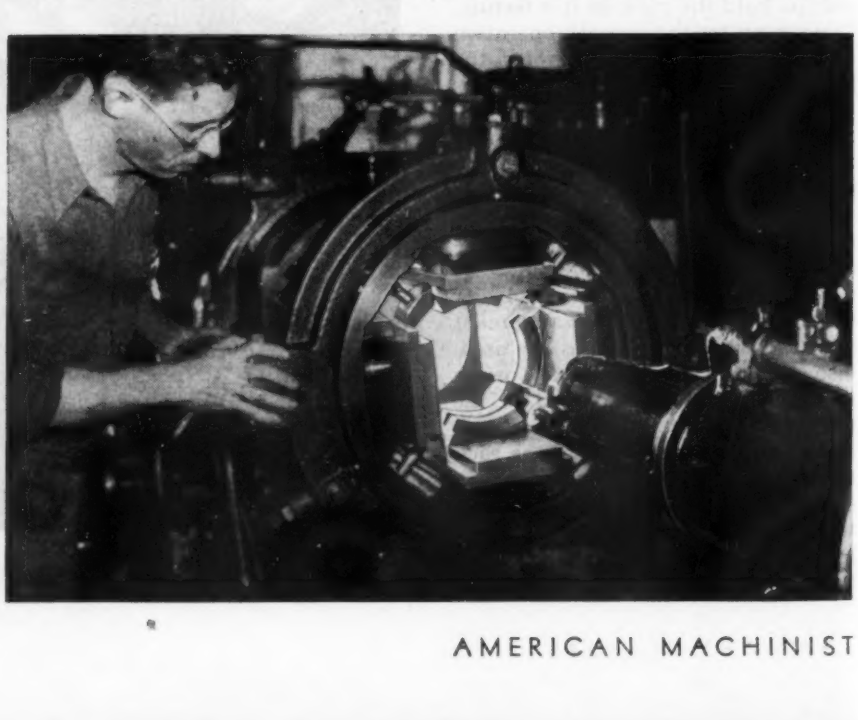
A carbide-tipped fly cutter is used to mill the radius at the top of the teeth in the ninth operation. This radius must be finished accurately. Three cuts are taken at 350 r.p.m., with a 1 in. per min. feed. Length of the cut is 3½ in. The simple fixture used for this operation is aligned with the arbor by using a special gage block. When properly located, the table is locked to prevent longitudinal movement. When the fly cutter has been set for milling the correct radius by using a 0.606 in. feeler gage block between the table rest and an angle plate gage, the table is lowered 0.150 in. for the first cut. For the second cut the table is raised 0.100 in., and it is again raised 0.050 in. for the finishing cut. The body of the fly cutter is designed to hold the ¾ × ¾ in. toolbit 1¼ in. away from the axis of rotation, thus giving a negative rake to the cutting edge.

A large No. 72-A Heald internal grinder is employed for finish grinding the bore of the hub on the back side of the rack forging in the tenth operation. A heavy faceplate fixture is employed for locating and holding the workpiece during this operation. This fixture has long guides to position the work and four clamps to hold it. A centering gage is used to align the bore of the piece before it is clamped. The bore first is rough ground to about 4.329 in. in diameter and then the wheel is dressed for finish grinding. The bore must be finished to within 4.3310-4.3316 in. diameter. It has been found that if the wheel is allowed to lap itself out the bore will not be tapered and it is easy to hold the 0.0006 in. tolerance. In addition to holding the diameter of the bore accurately it is essential that the bore be central with the tongues on each side of the forgings within 0.0005 in.

A special pot-type fixture has been developed for rough and finish milling the two teeth on each of these racks. Four racks are machined in each set-up. Spring plugs insure that each rack is set in proper relation to the slide in which it is mounted in the fixture. The special headstock on this Lees-Bradner machine carries a ⅞ in. end mill in an auxiliary spindle.

For the eleventh operation, the machine operator is provided with a carefully prepared set of instructions to insure that the procedure known to produce the most accurate work is followed each time. In this procedure, the first or roughing cut consists of milling away most of the metal between the two rack teeth in each of the four pieces. Then, the feed gears in the transmission are changed to increase the feed rate slightly and the cutter head is reset to finish the back side of each of the two teeth in each rack. Following this, the cutter is repositioned for a semi-finishing cut on the front side of the teeth, leaving approximately 0.010 in. of stock on this side for a final finishing cut. Care is used to insure that the fixture runs true in the steadyrest, and that all backlash is taken up on the feed screw when adjusting the cutter for one of the semi-finishing or finishing cuts. A vernier gage is employed for checking the tooth dimensions. The pot-chuck is rotated at a speed of 15.7 min. per revolution for the first roughing cut, and at 20 min. per rev. for all semi-finishing and finishing cuts. The cutter is rotated at 143 r.p.m. and the work is flooded with Threadkut oil. It usually requires approximately 6 hr. to finish four racks. The teeth milled in this operation are right-hand, have a 1.75 in. axial pitch and 1.75 in. lead with a helix angle of 3 deg. 56 min. The whole depth of tooth is 0.937 in. plus or minus 0.005 in. Tooth thickness at the pitch line must be 0.8719 to 0.8929 in. Backlash in the feed screw must be kept to a minimum in order to maintain accuracy of lead.

(Left)—Each rack is carefully inspected before the teeth are milled in the final operation. This gage checks the accuracy of the radius milling
(Below)—Four cuts are required to finish the teeth on the leveling-jack racks. Four racks are machined in each set-up on this Lees-Bradner machine



Practical Ideas

War-Winning Suggestions appearing here were recognized as meritorious by the Board for Individual Awards, War Production Drive, and the Navy Employees' Suggestion Program. They are offered to industry to aid in war production

Gage Attachment Helps Layout Scribing and Inspecting

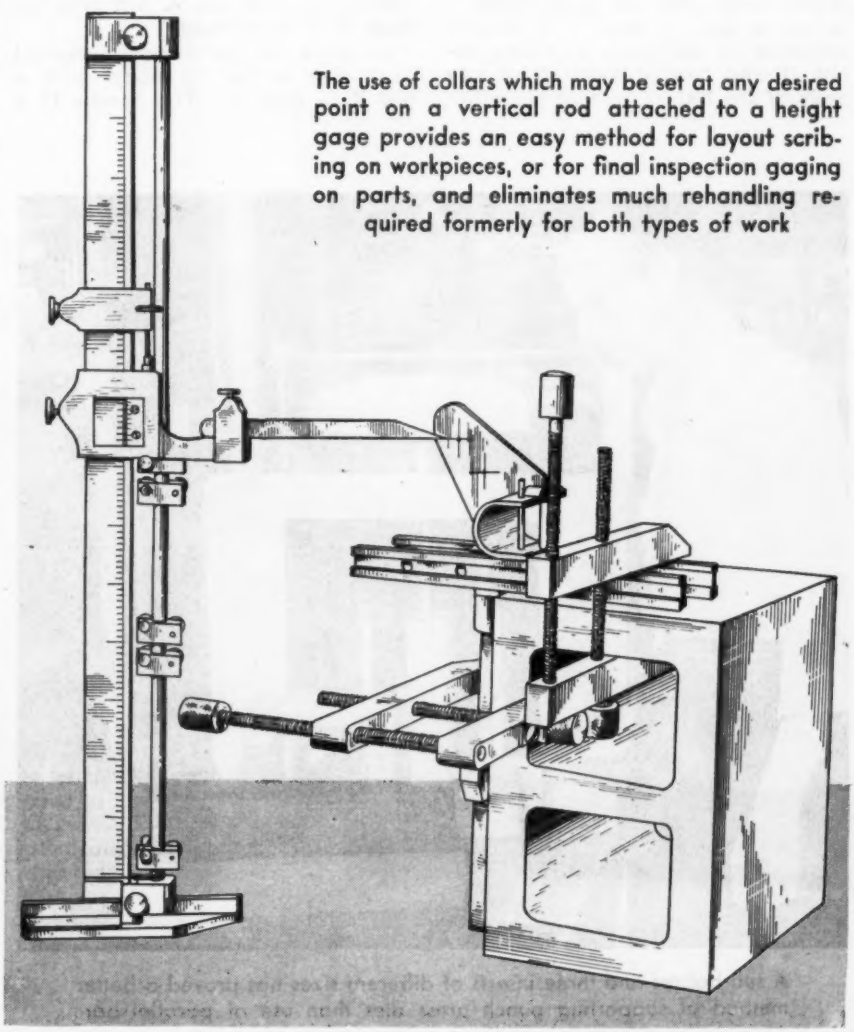
BY WILLIAM T. TEDRICK
Curtiss-Wright Corporation

When making measurements with a height gage in layout work for inspection checking, the method followed previously in this plant was to use the height gage only. In laying out quantities of the same part by hand the gage was set and the lines were scribed with the indicator arm for one dimension on each piece. The gage would then be set for the next dimension and each piece again scribed. For inspection work the height gage was used in the same way, as all similar pieces were checked for one dimension, the gage reset for the next dimension and the cycle repeated. A dial gage, with an indicator reading in one-thousandths of an inch, was used occasionally for final gaging inspection. In some cases each part had to be handled as many as five times.

In order to eliminate the rehandling of work and the use of an indicator a device was developed which is provided with means for rigid attachment to the foot and top of the height gage. A vertical slide rod parallel to the gage has sliding collars which may be positioned at any point on the rod. Each collar carries a horizontally mounted sliding pin which in an extended position serves as a stop for the height indicator arm on the height gage.

The attachment is mounted in fixed relation to the height gage, the collars are loosened and stacked on the lower end of the slide rod. The indicator arm is adjusted to the highest desired point and the top collar moved upward on the rod until the pin contacts the indicator arm. It is important that the adjustment be made by moving the collar to avoid error due to the 0.001 in. tolerance of the pin in the collar. The collar is locked in position on the rod and the pin retracted, leaving the indicator arm free to move to the next lower point of measurement on the work. Settings of the indicator arm and collars can be duplicated readily by extending the pins on the fixed collars to act as stops for the indicator.

The attachment is accurate within 0.001 in. and has made possible a saving in inspection time of 80 percent and has brought about an increase in production of 500 percent. The saving of time when the attachment is used for layout and scribing work is somewhat higher than that realized when used for inspection gaging, amounting to 90 percent in time production increased ten fold.

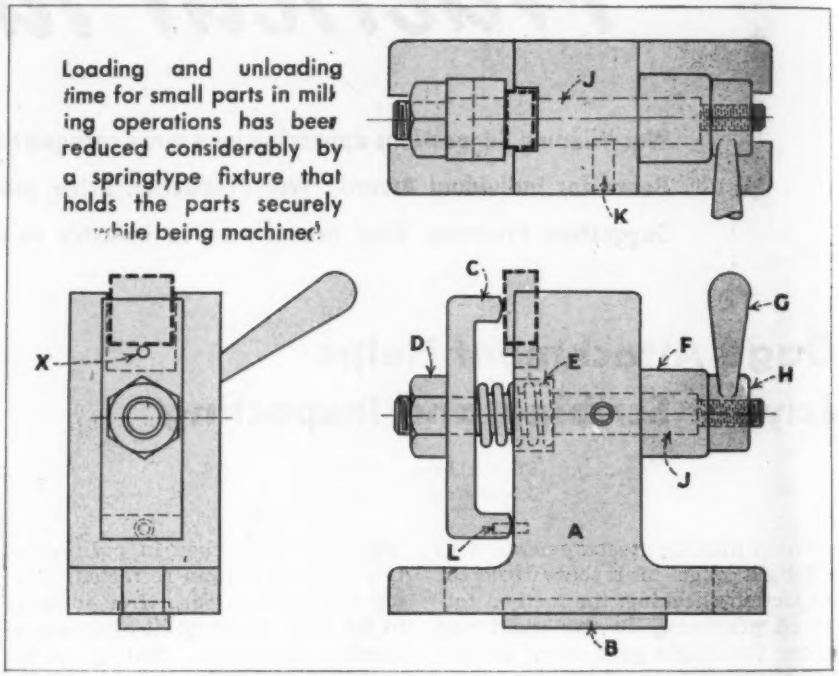


The use of collars which may be set at any desired point on a vertical rod attached to a height gage provides an easy method for layout scribing on workpieces, or for final inspection gaging on parts, and eliminates much rehandling required formerly for both types of work

Spring Clamp Speeds up Milling Of Small Parts

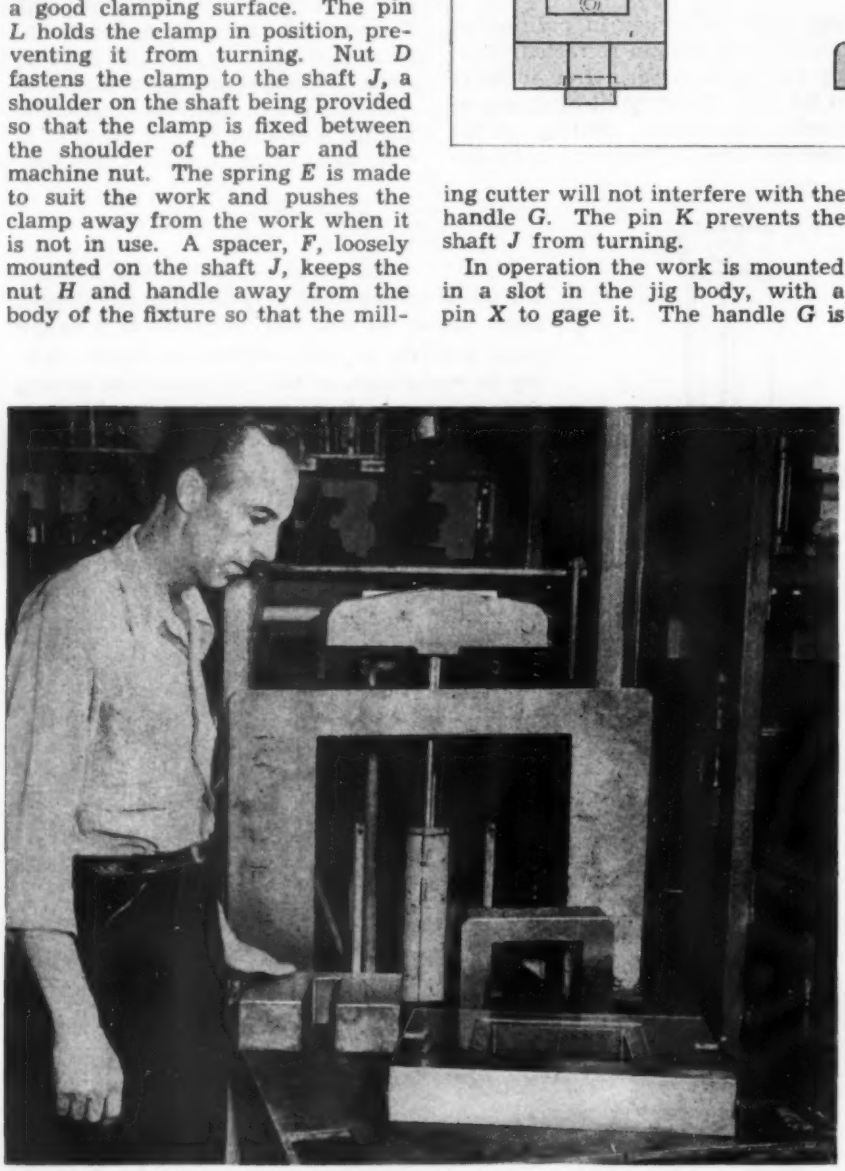
BY ALEX. S. ARNOTT

Loading and unloading small parts on a milling machine frequently requires more time than the operation itself, and trouble is often experienced in holding such parts securely during machining. In order to overcome these difficulties a milling fixture has been designed, the details of which are shown in the illustration.



The body *A* may be a casting, or may be made from machine steel. A key, *B*, keeps the fixture aligned with the milling machine table. The length of the clamp *C* should be evenly proportioned from the center, and the ends are rounded to give a good clamping surface. The pin *L* holds the clamp in position, preventing it from turning. Nut *D* fastens the clamp to the shaft *J*, a shoulder on the shaft being provided so that the clamp is fixed between the shoulder of the bar and the machine nut. The spring *E* is made to suit the work and pushes the clamp away from the work when it is not in use. A spacer, *F*, loosely mounted on the shaft *J*, keeps the nut *H* and handle away from the body of the fixture so that the milling cutter will not interfere with the handle *G*. The pin *K* prevents the shaft *J* from turning.

In operation the work is mounted in a slot in the jig body, with a pin *X* to gage it. The handle *G* is turned, causing the nut *H* to draw the shaft toward the work and in turn clamping the work in the fixture. The features of this design are easy removal of the work, and the handle is clear of the cutter.



A sub-bolster and three inserts of different sizes has proved a better method of supporting punch press dies than use of parallel bars

Sub-Bolster Eliminates Die Breakage on Punch Press

BY KENNETH BARTON
Northrop Aircraft, Inc.

Steel parallel bars were used previously in this plant for holding the dies in punch press operations, but they shifted occasionally during operations and covered some of the clearance holes of the dies, which necessitated reworking them after breakage. One die that was broken in this way required 175 man-hours of rework time. If parallel bars were added to dies, the cost was increased materially because each die required at least four bars.

A sub-bolster plate was suggested for supporting blank and pierce dies used in these operations, in order to eliminate breakage and expense. This sub-bolster is a 3-in. steel base made in a U-shape, giving a solid support on three sides. This base has a front section which is removable without disturbing a set-up on the punch press. There are three sizes of steel inserts which fit into this base, making possible the use of dies of various sizes. The sub-bolster is bolted to the bed of the punch press, thereby giving solid support to the die.

The sub-bolster consists of a main piece 16×12 in. It has a 10×10½ in. opening with the front piece removed and a 10×9 in. opening with the front piece in place. It will hold inserts up to 10×9 in. O.D. and varied inside cut-outs. There has been no breakage of dies since adoption of this sub-bolster plate, which is easily and cheaply constructed. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

Improved Shrinking Die With Roller-Activated Jaws

BY CHARLES E. BOHN
Douglas Aircraft Company, Inc.

Shrinking dies formerly used in this plant pinched the metal with a wedge-like action, which frequently moved the jaws, damaging the work. An improved die was developed in which the jaws are activated by rollers while working against heavy spring tension. This die gives a larger bearing surface on the material and greater holding and squeezing power, without damage to the part being shrunk.

Two hundred parts are now produced by the new type of die in the same time required formerly to produce 80, a saving of about 25 hours per plane. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

Damage to parts to be shrunk, has been eliminated by roller-activated jaws which also have greater holding and squeezing power

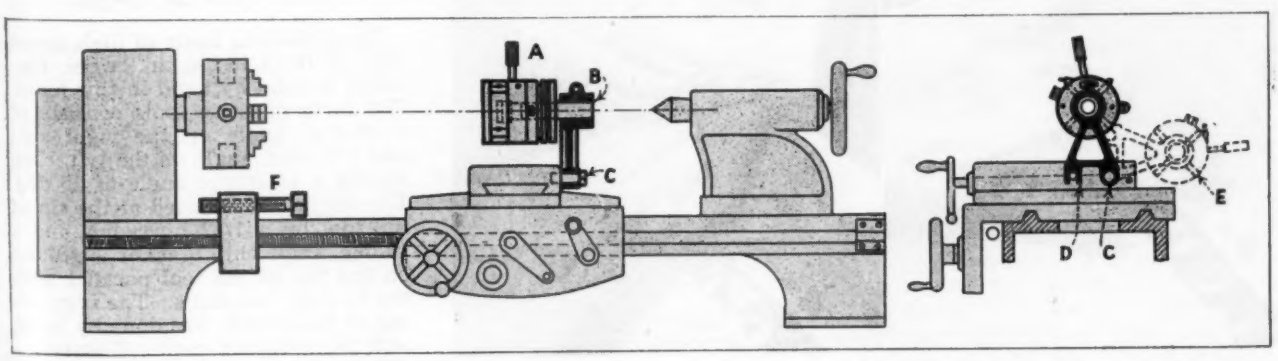
Lathe Die Attachment for Machining Threaded Bolts and Studs

BY MICHAEL AXLER

In a shop where small bolts and studs are produced on an engine lathe, with close accuracy required, a method was devised for cutting the threads with a diehead, which has increased production materially.

A fixture was made to fit a 14-in. lathe carriage, as shown in the illustration. A Geometric DD diehead with the floating feature is used, to compensate for imperfect centering of the die. The head, *A*, is held in the fixture *B*, which is fastened to the lathe carriage by the bolt *C*. The fixture *B* is pivoted on the bolt *C* and the other leg of the fixture is open, at *D*. When not in use it can be swung out of the way, as shown by the dotted lines at *E*, allowing use of the lathe for other work and without interference by the diehead. The length of the thread cut can be adjusted by means of the stop *F*, which can be removed from the lathe if desired.

The bolts and studs are machined on the lathe in the usual way. The diehead is swung into the cutting position and locked in place. The carriage is then moved up to the work and the threads are cut for whatever length is allowed by the stop *F*. When such work is finished the diehead can be moved back, making the lathe available for other work.



When threads are to be cut on small lots of bolts and studs, the work is done on an engine lathe with a die-head mounted on a fixture which can be removed easily when the lathe is required for other work

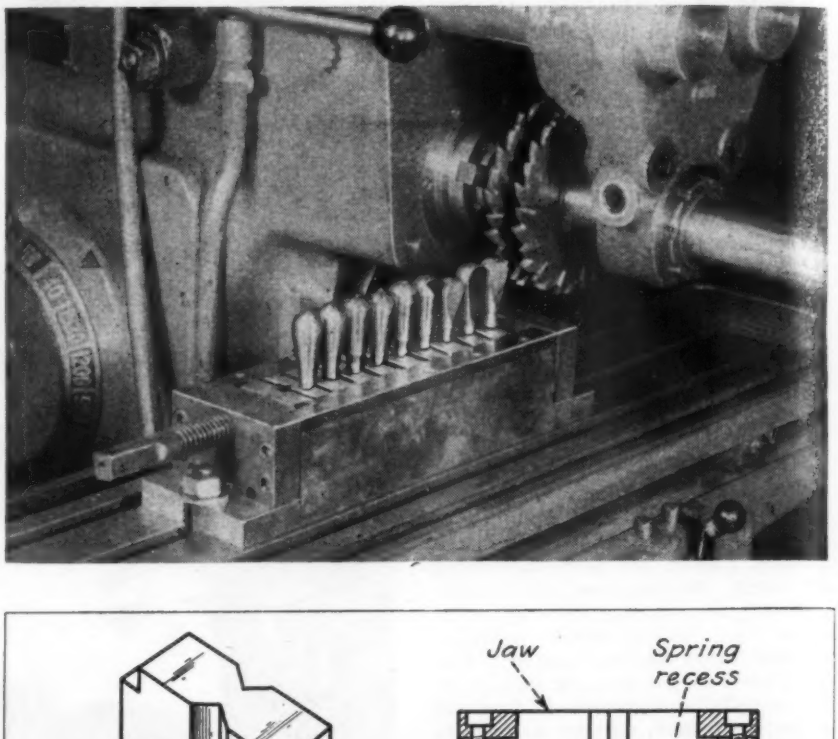
Equalizing Fixture Has Spring-Backed Jaws to Assist Unloading

BY FRED L. HOSAR
Naval Air Station, San Diego

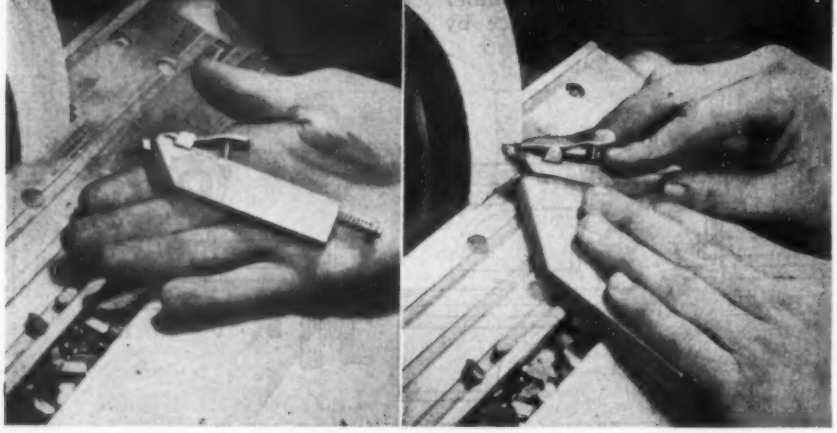
Milling of round stock or parts has been greatly facilitated at the shop here by the development of a multiple milling fixture. It is a vise-type fixture, with multiple jaws which will hold nine or more pieces at one setting. The jaws of the fixture have V-slots in each side to hold the stock in a vertical position. The fixture is aligned and bolted to the machine table. Jaws are clamped against the workpieces by the screw at the end of the fixture, the straddle-milling cut made and the parts unloaded. Springs, located between the V-blocks, are compressed into recesses in the blocks when the fixture is tightened on the work. At the completion of machining, the holding screw is loosened and the V-blocks are pushed apart by the expansion of the springs, allowing easy unloading and reloading of the fixture.

The flexible feature of the device makes it possible to clamp in one set-up multiple parts of varying diameters. Use of the chuck over a period of time has demonstrated that greater accuracy in quantity production of such parts can be obtained with the fixture than by means of the individual set-ups required formerly when the stock was not uniform in size.

An undetermined number of man-hours per week have been saved since adoption of this device in the regular work of this shop. *Suggestion Submitted Under the Navy Employees' Suggestion Programs*



Greater accuracy and increased production are obtained by use of this multiple milling fixture which consists of V-blocks, automatically opened by springs, to facilitate unloading and loading of parts. The flexibility of the device allows machining of parts of varying diameters at one set-up



Small toolbits are clamped into a holder and reground by means of a guide plate incorporating the desired side clearance angles

Holder and Guide Plate Facilitate Regrinding of Small Toolbits

BY LUTHER VAN THURM
Packard Motor Car Company

Small toolbits made of high-speed steel 3/16×3/16×⅝ in. were formerly ground by hand in this plant. The form of these tools consists of a 45-deg. angle on the right side and a 55-deg. angle on the left, each having a clearance angle of 25 deg. The angles are blended at the tip of the tool by a 1/32 in. radius and a 15 deg. angle chip breaker is ground on the top of the tool parallel with the 55 deg. side angle. The regrinding of these tools was done by hand, and the operation required considerable time.

In order to speed up this work a holder was designed, as shown. The

holder greatly facilitates the handling of these small tools. A guide plate was also designed which has a 45 deg. angle on the right and a 55 deg. angle on the left, to match the form of the tools. The clearance angle of 25 deg. is obtained by setting the table of the grinder at that angle below horizontal. A separate holder and guide plate must be made for each design of the tool. The operator forces the tool out of the holder when grinding is completed. The holder is easy to make, but saves considerable time when grinding a large number of tools at one run.

When grinding by hand one man averaged 150 tools in ten hours. This time has been cut to three hours for the same number of tools, with a total saving in man-hours of 2,000 a year. Use of a holder of the same type for grinding another form of tools has brought about a comparable saving in grinding time, making a total saving of approximately 4,000 man-hours a year.

Contours of Large Gear Teeth Restored by Grinding

BY VIC LEPKY

Bethlehem Steel Company, Shipbuilding Division, San Francisco

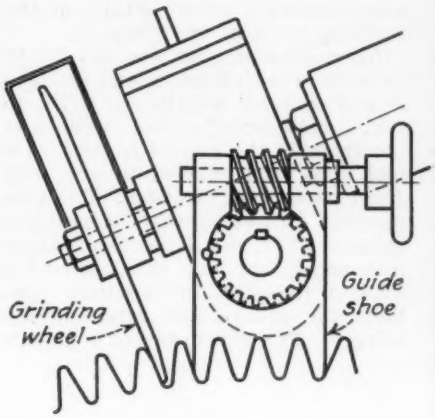
The teeth of large reduction gears which had been damaged were reconditioned by hand filing and honing, a tedious and time-consuming operation, which was often unsatisfactory. A portable gear tooth grinding unit was designed to eliminate the hand work required formerly and has proved satisfactory both as to time required and results obtained.

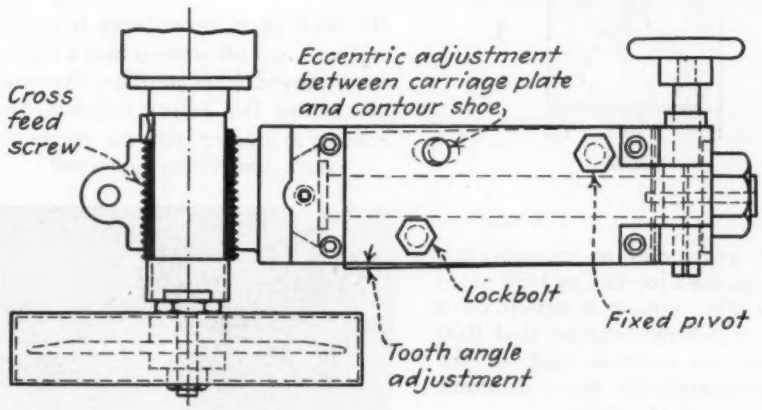
The grinding unit weighs about 30 lb. and the details of the device are shown in the illustration. It is operated by hand and in regrinding teeth is moved along the grooves in a horizontal position, with a motion similar to that of a planer. The grinder is air driven at 7,000 r.p.m. It is equipped with a narrow-face 6-in. grinding wheel and a sheet metal guard.

The first step is to form a babbit metal guide shoe, which can be made to fit any kind of gear teeth, irrespective of diameter, face or pitch and including the herringbone type. The guide shoe is attached to the bottom of the grinding unit and keeps it in the right position with respect to the type of teeth being ground. Adjustments available on the unit allow grinding of any part of the contoured surface of any tooth and it can be operated by either a right- or left-handed operator. An eccentric bolt is used to keep the alignment of the guide shoe grooves parallel to the grinding edge of the wheel. Worm gear control on the center bolt allows the head to oscillate, if desired. The vertical head is on a dovetail, with a hand feed screw.

Many man-hours required formerly for hand filing and honing also much unsatisfactory work, have been eliminated by the unit, the use of which insures uniform contours of teeth, regardless of their form or type. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

Damaged teeth of large gears were restored by hand filing and honing, which was frequently unsatisfactory. A hand grinding unit now restores true uniform contours to the teeth in much less time than was required formerly





An Economical Method for Making High-Speed Button Dies

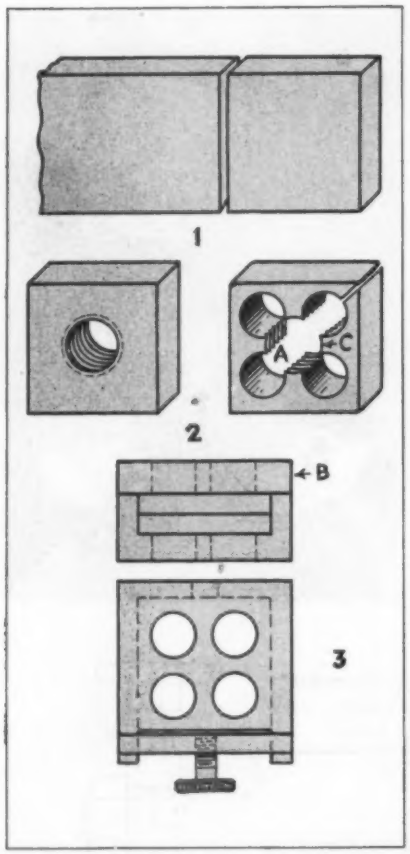
BY R. A. SCHULTZ

Noblett & Forest, Woodville, South Australia

A method for making button dies which is economical, but effective, has been adopted in this shop. Blanks are cut from flat 18 percent tungsten stock, the ends and sides are machined in a bank on a shaper and the faces ground on a surface grinder. A number are kept at this stage, shown in Fig. 1, from which stock can be drawn as required.

Drilling and tapping is next carried out as in Fig. 2, after which the holes which form the cutting edges of the die are drilled. This is done with the jig shown in Fig. 3, which has a number of guide plates *B*, for the various sizes of threads. This is carried out on a conventional drill press, using a short drill, sleeved to guide it through the plate *B*. The drill point is ground at about 170 deg. The dies are hardened by sight, using an oxyacetylene flame.

The cutting edge *A* is ground on a high-speed drilling machine by using the drill jig mounted on a simple indexing plate. These two are usually attached and drilling is done with the indexing plate clamped to the drill table, indexing for each hole. A small mounted wheel is held in the chuck for grinding and



A drill press and an oxyacetylene flame are used for making high-speed button dies, without a set-up on a lathe or milling machine, and their performance exceeds that of the regular commercial types available in Australia

is fed past the cutting edge. Land C is relieved similarly, a tapered wheel being fed down to the cutting edge.

The advantages of this method of manufacture are that a blank can be selected and a die or dies made, using a drill press and an oxyacetylene flame, without a set-up on either mill or lathe. The performance of these dies is better than any available here, the teeth of which break after short runs. The cost of our dies approximates that of the types sold commercially in Australia, although higher than that of corresponding tools in the United States.

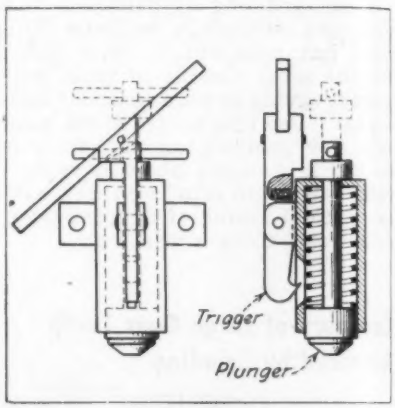
Automatic Stop Prevents Damage Of Turret Lathe Parts

BY JOHN C. MADSON
Navy Yard, New York

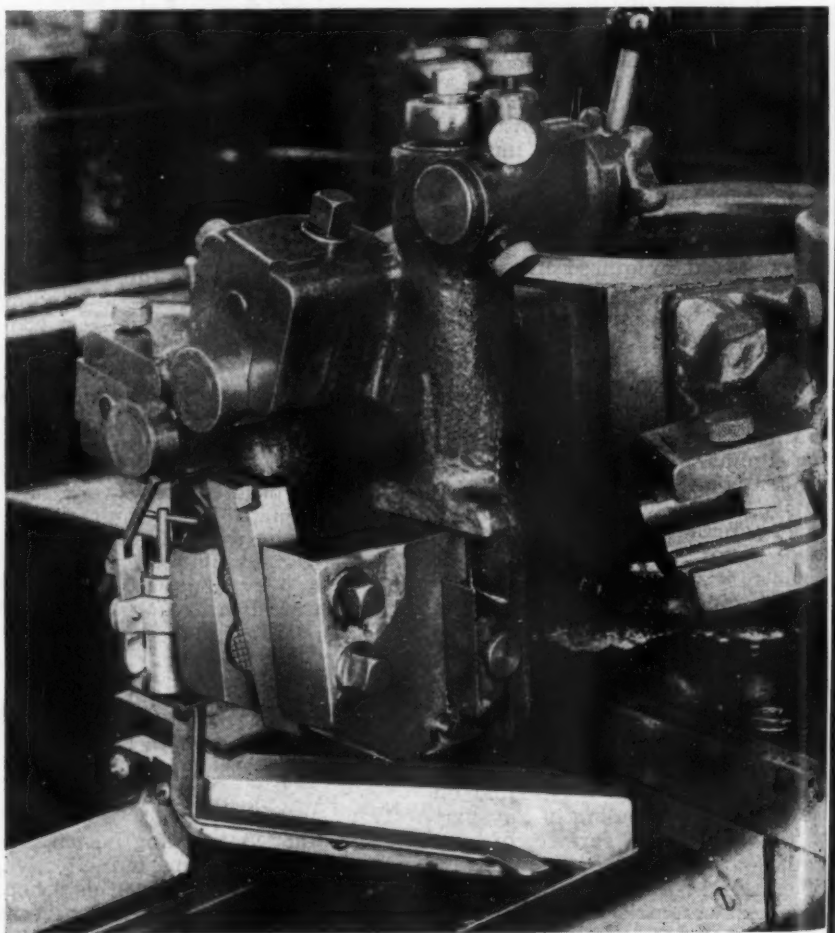
Box tools used on turret lathes were damaged frequently by continued feed of the turret toward the revolving stock after the tool was cracked or broken, or had shifted in position. When the feed continued in such cases it brought the rollers on the turret, which are only 1/16 in. away from the toolbit, into the revolving stock, resulting in burns or breakage. Not only does this damage the rollers, which are expensive and hard to replace, but also imposes a severe strain on the working parts of the lathe.

An automatic stop was developed to prevent such damage and the feed is now cut off within the 1/16 in. space between the tool point and the front of the rollers as soon as a tool slips or is moved in any way from its correct position. The stop consists of two springs, a plunger, cylinder, two small pieces of angle iron and ½ in. rod. When a tool is broken the stop immediately contacts the square rod, releasing the trigger. This action forces a spring-driven plunger against the raised portion of the latch, which disconnects the feed. The plunger is reset by pulling up the handle sufficiently to permit resetting of the trigger.

The cost of repairs and replacement of damaged rollers in the past has amounted to thousands of dollars per year in labor and material and there has been a corresponding loss of machine time, all of which has been eliminated by the automatic stop. *Suggestion Submitted Under the Navy Employees' Suggestion Program.*



The feed of a turret lathe is automatically cut off when a tool is broken or moved from position, thereby preventing the turret rollers from coming in contact with the revolving stock and being damaged



RFC Plans Immediate Sale Of Government-Owned Plants

Property having original value of $8,000,000,000 will be sold to highest bidders, subject to occupancy at end of war service

COMPANIES planning to expand or move their operations in coming months have noted with great interest the Reconstruction Finance Corporation's plans to place all government-owned plants and facilities on the market immediately, although sales will be made for occupancy of these properties after they are no longer required for war use. Costing $8,000,000,000 originally, property to be placed on sale includes 585 plants, 300 "scrambled facilities" (wings on privately owned plants or buildings set amidst privately owned plants), and about 900 installations of government-owned machinery and equipment in private plants.

In response to a recent inquiry by Jesse Jones, U. S. Secretary of Commerce, operators of 65 percent of these plants indicated an interest in buying or leasing them at the end of their wartime use. Up to October 10, 1944, 252 contractors operating 325 DPC plants were interested in buying or leasing; 77 contractors operating 120 plants had not reached a decision; while 39 contractors operating 55 plants said they would not be interested.

Despite the interest evinced by these contractors, most of whom have options to buy the plants they are operating, the RFC may ask them to waive their options so that all prospective buyers can bid for the property. Most option-clause agreements on DPC plants enable the operator to arrange for their purchase for a period up to 90 days after expiration of the operating

This modern machine plant is one of the hundreds of government-owned properties scheduled to be sold under a disposal plan developed by the Reconstruction Finance Corporation.

agreement with the government. Waiving of the options enables other interests to bid for such plants, after which the option-holder is offered a further opportunity of buying the plant by meeting the highest outstanding offer that has been made. Specific depreciation rates are usually set in the operating contract, and in some cases a definite residual value for the property is set regardless of use.

Although the RFC was originally charged with this disposal job by the Surplus War Property Administration, it is generally believed that this assignment will be continued by the Surplus Property Board, to be set up under the provisions of the Surplus Property Act. The reasons given point to the fact that these plants were originally financed by the Defense Plant Corporation, a subsidiary of RFC, and also to the fact that RFC has effectively laid down the groundwork for the disposal task.

To help facilitate sales, engineering surveys of these properties have been made and these data is available to prospective purchasers. Moreover, the RFC has already begun advertisements of some properties, and has prepared circulars of individual plants, showing the size of the plant, location, machinery and equipment, transportation facilities and even the floor plans along with photos of the particular property. In addition to this, district offices of the RFC will have available a "Briefalog," containing short descriptions of the salient features of these properties drawn up from the results of the engineering surveys. From this material, prospective purchasers will be able to find out what is most suitable for their needs, and then arrange to inspect the plant.

It should be emphasized that the government appreciates that it cannot recover its original investment on these plants, in view of war-inflated construction costs, expenses for camouflage, air-raid shelters, and the sometimes peculiar locations of these plants. Thus, allowances for these factors will be made. Moreover, RFC is prepared to remove certain, if not all, installed equipment from plants which have been turning out highly specialized war items, to facilitate reconversion to peacetime use. Other plants, producing items such as machine tools, steel tubing, carburetors, and so on, could easily be continued in operation by their purchasers. Furthermore, the government realizes that about half of its $15,000,000,000 in war plants will not be salable for non-war uses, so that some of them will be held as standby units, while others will be used to store surplus goods.

A recent analysis of the size of government-owned plants reveals that some 10.5 percent are worth over $10,000,000; 31.7 percent are worth from $1,000,000 to $10,000,000; 43.1 percent are in the $100,000 to $1,000,000 group; and 14.7 percent are plants costing less than $100,000 each. There is little question that some plants, such as the Dangerfield, Texas, blast-furnace operation and the large magnesium plant in Nevada, will be difficult to adapt to private operation because of their size, location and other economic handicaps. But most government plants are well located and easily adaptable to private operation.

Sole handicap to present sales is a provision of the Surplus Property Act requiring the Surplus Property Board to make a report to Congress by January 4, 1944, on property worth over $5,000,000 in the following groups: (1) Aluminum plants; (2) magnesium plants; (3) synthetic rubber plants; (4) chemical plants; (5) aviation gasoline plants; (6) iron and steel plants; (7) pipelines; (8) aircraft plants and facilities; (9) shipyards; (10) transportation facilities; and (11) radio and electrical equipment plants. This report must include a description of the property, economic problems involved, and a tentative program for handling disposition of these plants. Plants

TYPICAL "BRIEFALOG" LISTING

Local banks and Chambers of Commerce now have Briefalogs distributed by the Reconstruction Finance Corporation, listing government-owned plants and plant sites which will eventually be available for sale. Typical of the information available in this Briefalog is the following abstract: Plancor No. 1149, General Machinery Corporation, Hamilton, Ohio.

LAND: Consists of 1,328 acres bounded by the B. & O. Railroad, improved property of Ford Motor Co., and unimproved property of the lessee. Easement for utilities, access driveway, storm sewer and rail switch service have been obtained. A small tract is available to the south.

BUILDINGS: Facilities include 2 buildings, 37,054 sq. ft. total floor space; concrete frame, tile and brick inclosures; wood roof framing; composition roofing.

Crankshaft building, 35,854 sq. ft. floor space; has two 30-ton traveling cranes; one 10-ton traveling crane; Lee Engineering Co. type forced-air heating plant; railroad switch for each end of building.

Women's wash and locker room, 1,200 sq. ft. floor space; off leasehold construction; built adjoining lessee's main engine plant.

MACHINERY AND EQUIPMENT: 241 pieces including 139 pieces production machinery and equipment consisting of cutter grinders, grinders, radial drills, tool grinders, mold dryers, saws, milling machines, boring mills, lathes, plates, cranes and hoists; 92 pieces of portable tools consisting of chipping hammers, leveling blocks, impact wrenches, hand clamps, air drills.

10 pieces of automotive equipment (truck tractors with trailers).

1 lot of office equipment and furniture.

1 lot of kitchen equipment.

Interior view of the machine shop of the Plancor No. 765 property, which also includes a foundry, administration building, cafeteria, gate house and infirmary. Production equipment includes open-hearth furnaces, planers, lathes, boring, grinding and milling machines and presses

in the first seven groups cannot be disposed of until 30 days after this report has been submitted and only while Congress is in session, although leases up to five years for these properties can be made. Sales of items in the last four groups can be authorized at any time.

This limitation on certain plants worth over $5,000,000 will expire on February 4, 1945. However, it is possible that the wording of the Act indicates that Congress will carefully watch disposal of these plants, and companies trying to buy them may lay themselves open to Congressional attacks as taking "monopolistic" action. Since it would seem logical that only large concerns would be in a position to purchase plants of that size, this situation may militate against such sales. Fortunately, this only involves less than 25 percent of the total number of government-owned plants, so that important progress can be made with other property in the meantime.

Since the Surplus Property Act directs that disposal should "discourage monopolistic practices" and "give maximum aid in development of the maximum number of independent operators in trade and industry," it is possible that certain large operators of government-owned plants may not be permitted to exercise their purchase options at all. As it is, certain properties have no purchase options for their present operators, and these include aluminum, rubber, and magnesium plants, the Geneva steel mill, and the Studebaker engine plant.

Sales terms will be arranged on the basis of "usual commercial practices," according to the RFC, and credit provisions may also be made. The emphasis will be on sales rather than leases, but the latter will be offered where expedient. At the same time, purchasers could easily arrange to buy surplus equipment and machinery necessary to rehabilitate the plant from the RFC which has also been charged with the disposal of such items.

Prospective buyers can go to their nearest regional office of the RFC (see appended list) to secure all the necessary information regarding facilities they may acquire. Where this is not possible or convenient, they can examine RFC Briefalogs available at local banks or Chamber of Commerce offices. Such inquiries entail no responsibility and involve a minimum of red tape in keeping with RFC policies.

In communities where the shutting down of large plants would be a severe blow to the local economy, RFC will encourage "multiple-leasing" when feasible from an engineering viewpoint. Under the plan, the large property could be subdivided and space rented to a number of different types of businesses of varying sizes, all of which could fit within the giant plant. The advantages of such arrangements to small concerns is that they would be able to enjoy the low rates of electricity, low handling charges, convenient transportation facilities and other attributes possessed by large modern plants. Such action may save communities from becoming "ghost towns" merely because no single purchaser for the plant is in prospect.

As to scrambled facilities, it is likely that the 300 projects involving wings on plants or separate buildings erected in the midst of a private company's integrated plants might be sold or leased in some cases, where the private firms in-

volved do not wish to take over the property. In a pinch, these scrambled facilities could be used to store termination inventories to aid industry's reconversion.

As for the remaining 900 projects involving machinery and equipment "scrambled" in with privately owned items, these will either be sold to the particular operators or removed for sale elsewhere. Some of them, such as cooling pits in steel plants, may be left intact as "standby" equipment for possible reuse in future emergencies.

Thus, even though only 28 properties had actually been declared surplus and were available for sale at the end of September, 1944, the RFC is immediately determining the market prospects for all government-owned plants adaptable to peacetime use. The marketing of these properties before the end of the war will go far toward lessening the economic impact of peace upon the nation.

This machine shop is part of a 36-plant property with a total floor area of 333,496 sq. ft. This Texas plant, designated as Plancor No. 143, has a railroad siding and its production equipment includes drill presses, buffers, grinders, lathes and millers

RECONSTRUCTION FINANCE CORPORATION OFFICES

To secure more detailed information about these plants, prospective purchasers should go to their nearest RFC office

ATLANTA REGION—Healey Building, Atlanta 3, Ga., M. E. Everett, Manager. (Georgia, Alabama, Tennessee, and Florida.)

BOSTON REGION—10 Post Office Square, Boston 9, Mass., John J. Hagerty, Manager. (Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island.)

CHARLOTTE REGION—109 West Third Street, Charlotte 1, N. C., John A. Campbell, Jr., Manager. (North Carolina and South Carolina.)

CHICAGO REGION—208 South La Salle Street, Chicago 4, Ill., B. A. Mattingly, Manager. (Illinois, Indiana, and Iowa).

CLEVELAND REGION—Federal Reserve Bank Building, Cleveland 1, Ohio, J. A. Fraser, Manager. (Ohio and West Virginia.)

DALLAS REGION—Cotton Exchange Building, Dallas 1, Tex., L. B. Glidden, Manager. (Texas—northern and western parts.)

DENVER REGION—Boston Building, Denver 2, Colo., Ross L. Hudson, Manager. (Colorado and New Mexico.)

DETROIT REGION—607 Shelby Street, Detroit 26, Mich., Arthur J. Fushman, Manager. (Michigan—except upper peninsula.)

HOUSTON REGION—723 Main Street, Houston 2, Tex., W. I. Phillips, Manager. (Texas—southeastern part.)

KANSAS CITY REGION—Federal Reserve Bank Building, Kansas City 6, Mo., Albert L. Strong, Manager. (Kansas and Oklahoma.)

LOS ANGELES REGION—Pacific Mutual Building, Los Angeles, Cal., Hector C. Haught, Manager. (Arizona and Southern California.)

MINNEAPOLIS REGION—McKnight Building, Minneapolis 1, Minn., China R. Clarke, Manager. (Minnesota, Wisconsin, North Dakota, South Dakota, Michigan—upper peninsula.)

NEW ORLEANS REGION—837 Gravier Street, New Orleans 12, La., George W. Robertson, Manager. (Louisiana and Mississippi.)

NEW YORK REGION—33 Liberty Street, New York 5, N. Y., Thomas J. Ahearn, Jr., Manager. (New York and New Jersey.)

OMAHA REGION—Woodmen of the World Building, Omaha 2, Neb., Herbert S. Daniel, Manager. (Wyoming and Nebraska.)

PHILADELPHIA REGION—1528 Walnut Street, Philadelphia 2, Pa., E. Raymond Scott, Manager. (Pennsylvania and Delaware.)

PORTLAND REGION—Pittock Block, Portland 5, Oregon, William Kennedy, Manager. (Washington, Idaho, Montana and Oregon.)

RICHMOND REGION—Richmond Trust Building, Seventh & Main Streets, Richmond 19, Va., W. B. Cloe, Manager. (Maryland, Virginia and Washington, D. C.)

ST. LOUIS REGION—320 North Fourth Street, St. Louis 2, Mo., B. Glenn Gulledge, Manager. (Missouri, Kentucky and Arkansas.)

SAN ANTONIO REGION—Alamo National Building, San Antonio 5, Tex., L. C. Andrews, Manager. (Texas—southern part.)

SAN FRANCISCO REGION—200 Bush Street, San Francisco 4, Cal., John S. McCullough, Jr., Manager. (Nevada and Northern California.)

SALT LAKE CITY REGION—Dooly Building, Salt Lake City 1, Utah, Gerald L. Leaver, Manager. (Utah.)

Surplus Disposal System Aims at Speedy Contract Settlements

Remington Rand Propeller plant establishes program of careful inventories of surplus stocks preparatory to sales campaign. The system contributes to clearing plant space for the receipt of new parts and equipment

DISPOSAL OF SURPLUSES at the Johnson City plant of Remington Rand Propeller Division is as routine and efficient as the purchasing of raw materials. This expedites the clearance of plant space for receipt of parts and tools for other, or new, contracts, while speeding the completion of details upon which contract settlements can be based.

As a first step in the operation of this plan, all items are pruned back to a 60-day working limit, or at least to a practical working limit. Items found to be in excess of these limits—and any others made surplus by cancellations or alterations of contracts—are declared on a "request to sell form." This action is taken on the recommendation of a plant salvage committee.

From that point on, begins an intensive 30- to 60-day selling campaign. Original suppliers are asked to accept material back for credit, local industries are canvassed by telephone, lists of current surplus are circulated among the managers of all Remington Rand plants and innumerable other plausible users are contacted by sales letters. A concrete example of how effectively this system works can be cited in the fact that there have been instances when material declared surplus has found its way into the plant of a new user within 48 hours. When material does not move within a reasonable length of time, and it appears there is little market for the surplus, the material is declared on the proper forms "249C-1-2- or 3." These are forwarded immediately to the plant clearance officer, who in turn sends them to the nearest area disposal section.

For 15 days from the date of mailing to the area offices, the surplus stocks are considered dormant and Remington Rand does not have the authority to remove these surpluses from its plant without the permission of the contracting officer. Sufficient copies are distributed at this time to give the Service Command an opportunity to procure any of the listed items for their use. If none of the material is required by any of the Air Force Service Units, the plant clearance officer requests shipping instructions. It is only when material leaves the Remington Rand plant under these shipping orders, that the company considers itself relieved of its financial responsibility.

Removal is Speeded

As the set-up now operates, not more than 60 days need elapse from the time the material is declared surplus until it has been moved from the plant.

Under an agreement with the Army, proof of exhaustion of potential buyers, during the 30- or 60 day period of offering the material for sale, will allow the disposal offcer to proceed at once with the next step. This agreement is an obvious time-saver.

At times a change in design revives the need for materials previously declared surplus. In such an instance, if the material is still in the plant and unsold, a form "SWP 1-A or A-1," is issued, requesting its return to inventory. If disposal has already proceeded to the point an Army shipping order has been issued, the cancellation of this order is requested.

Seek Out Surplus Tools

Tools, machinery and equipment are not overlooked in this disposal plan. Tool life experience is used as a basis for inventory and tools with no foreseeable use—but an unamortized life—after the end of their current contract, are declared surplus and plans laid for their immediate removal.

If a contract is terminated, or product design so changed as to no longer require use of a piece of equipment, such advance steps will have paved the way for disposal.

Every 60 days the tools on hand are inventoried, the inventory reviewed by the plant clearance officer and any items in excess of a 60-day supply are declared surplus. This is a constantly shifting picture, since normal tool life expectancy has increased materially as workers have gained more experience and ability. It might be noted that incentive systems have increased tool life, since workers know they can get more production by taking care of tools

and by reducing down-time through keeping tool changes and sharpening to a minimum.

Foresee Speedier Settlements

Remington Rand Propeller Division expects this surplus disposal plan will make possible a contract settlement within 30 days from the receipt of termination notice.

Much of the delay in settlement of terminated contracts comes from slow preparation and submission of surplus inventory, followed by time-consuming attempts to dispose of the left-over materials and tools.

In this connection, a surprising number of subcontractors have submitted final claims of "no cost to Remington Rand." Presumably, they prefer to take a small loss on materials or tools in order to expedite the settlement, or else they could turn surpluses to normal civilian production.

One subcontractor summed up much of the surplus disposal picture when he submitted a claim for $2,200 of surplus, along with an offer of $29 for the items as scrap.

Plant clearance officers have been variously likened to purchasing officers in reverse, or to sales managers or heads of salvage departments. Whatever the parallel, Remington Rand Propeller Division is conducting its surplus disposal with speedy contract settlement as its objective.

RECONVERSION

A Spot Authorization Case History:

MONARCH GOVERNOR RECONVERTS

PERMITTED under the current spot authorization procedure to resume manufacture of rear-view driving mirrors, the Monarch Governor Company, Detroit, has found that much of the experience gained in its war production will vastly improve the quality and economy of its peacetime production. Using manpower and facilities left idle by cutbacks amounting to more than 25 percent of its war contracts, Monarch Governor Company has accomplished this partial reconversion with a minimum of delay and no loss of manhours.

The company, normally engaged in the manufacture of automotive governors, mirrors, antennas, and brake accessories, has lived through two wars, converted and reconverted twice. Last time, reconversion nearly forced it out of business because it was not prepared for contract termination and could not secure government tools. This time, it is starting an easy transition back to civilian production and actually finding itself benefited by its period of complete wartime conversion to manufacture of urgently needed aircraft screw-machine parts and other military items.

Plant clearance presented no great difficulty, inasmuch as none of the machinery in the plant was government-owned and none had to be replaced or altered in any way to prepare for mirror manufacture. The company simply took its old tools and dies out of storage and resumed production.

There was, however, the problem of surplus disposal, the inevitable companion of contract terminations. Surplus inventories of materials, parts-in-process, jigs, tools, and fixtures had to be disposed of. It was soon discovered by the company through its experience with this phase of reconversion that settlement of its claims and actual physical disposal of the surplus stock came quickly—often within 30 days—when: Claims were filed promptly; concrete answers and specific figures were entered in detail under all pertinent headings; and surplus material was segregated and kept properly greased and systematically packaged.

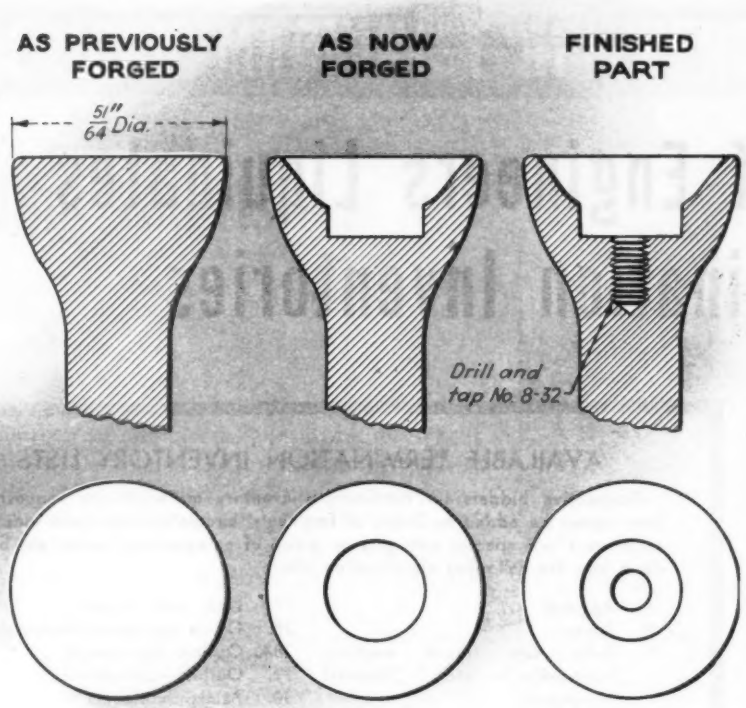
The company checks inventories and fills out the standard claim forms on the same day that the cutback or termination notice is received.

All classes and categories of surplus material are individually packaged in the shipping room after pieces are weighed and greased in the stockroom. Cartons holding this material are labeled "Property of U. S. Gov't.—Hands Off" and marked to show exactly what they contain and how much. From the shipping room, the cartons are moved to an extra stock room—and stay there until the arrival of the government inspector. If the inspector is convinced that there is nothing slipshod or casual about the weighing, sorting, and packaging of the equipment, there are no delays. If not, considerable loss of time might result from delayed approvals.

For the most part, the necessary materials for mirror production have not been difficult to obtain. Brass is the only stumbling block to date. For the mirror casing, 3040 grain sheet or strip is required—width 4½ in., thickness 0.018–0.024 in. There is on hand only enough to fill slightly less than one-half the company's mirror production quota. However, it is hoped that various surplus stockpiles throughout the country may be tapped for the necessary brass before depletion of existing stocks brings mirror production to a halt.

One important byproduct of conversion to war production was the company's rapid development of an important new product, a fly-ball or centrifugal governor. This new governor is expected to have a great field after the war wherever internal combustion engines are used and especially in farm tractors and other farm machinery. Its development was pushed to meet urgent wartime demands for its use in landing barge engines, Army and Navy trouble-shooter trucks and mobile workshops, and for the gasoline-driven generators that power anti-aircraft searchlights.

Method improvements cited by the company as stemming directly from



One beneficial wartime lesson resulted in this improved forging method. New forgings for auto mirror arms will require less machining

war production fall into four categories: 1. Inspection methods; 2. jigging; 3. forcing design; and 4. rust-proofing.

In addition, the company has discovered that specialization and improvements in methods and equipment by manufacturers of screw-machine parts and stampings have progressed so far during the war years that companies like Monarch Governor will ordinarily find it more economical to buy these parts from them and confine their own operations largely to assembly work.

Of vast importance to the company's future production efforts will be the veritable revolution in inspection methods brought about by the war. The keynote is the carrying of inspection back to the first operation and continuing it through every stage in manufacture; nipping errors in the bud, or the tendency toward them; spotting and correcting flaws where they occur rather than merely recording accumulated error in the finished material.

Confronted with a constantly varying pattern of war orders—many of them for second-operation work exclusively—the company found it expedient to develop one general-purpose jig to take the place of countless special ones which had to be scrapped after every change in specifications. The new jig proved so successful that it has almost completely eliminated jigging problems from the company's postwar production horizon.

With a stock capacity ranging from 1/16 to 1 in. cross-sections, it can be used in either the horizontal or vertical position and is designed to provide ample chip clearance. There is no axial movement in opening and closing of the jig, which insures positive axial dimension control. The jig is now being produced on a commercial basis by the company for use with drilling, boring, milling, and grinding machines.

From something observed in the production of a tank part came an idea that improved the forging of the mirror arm and eliminated considerable machining. Instead of simply flattening the head and hogging out metal later to make a socket, the supplier has been shown how to include the socket in the forging by attaching a special rounded die to the punch. The operation is no more difficult now and the savings in time, manpower and materials mark a decided step forward.

One other improvement born of the company's war production experience has been carried over into its routine peacetime production: A less expensive and better method of rust-proofing by using cadmium in place of zinc.

Through new products developed during the war, and improved operating methods gained from war contract experience, Monarch has entered its reconversion stage with confidence in its postwar prospects.

DELCO AMENDS SUBCONTRACTS SWIFTLY

The Delco Products Division of General Motors Corporation has prepared a multigraphed set of forms by which it is arranging to incorporate approved termination provisions into all outstanding agreements with its suppliers and subcontractors. Its technique offers a simple and speedy way of amending existing contracts to have them conform with standards set by the Contract Settlement Act, and is particularly adaptable to prime contractors with dozens or hundreds of subcontractors.

The first of Delco's three forms is a letter to the subcontractor or supplier informing him that the government recommends the use of "the Uniform Subcontract Termination Article", and requesting that an enclosed agreement to this effect be executed and returned. The letter requests subcontractors to explain their objections in the event that the agreement is unacceptable. It further points out that future purchase orders will have the Uniform Subcontract Termination Article printed on it as a standard provision.

Enclosed with this letter to suppliers is a copy of a second form explaining the approved termination provision, and two copies of a third form which is a formal agreement to incorporate the provision into outstanding purchase orders not yet filled. The agreement is already filled out with the name of the subcontractor, the date, and the witnessed signature of a company executive. Thus, all the recipient need do is sign one copy of this form and return it to Delco Products, and retain the duplicate for his own records.

Corps of Engineers Liquidates Termination Inventories

IN ACCORDANCE with the Joint Termination Regulations recently published by the Office of Contract Settlement, the Army is attempting to do a swift job of liquidating termination inventories in order to reduce the over-all plant clearance problem. The final surplus disposal job will be hastened if termination inventories can be sold within the 60-day interval after an acceptable inventory list has been submitted by the terminated contractor.

Under the Contract Settlement Act, a termination inventory which is not disposed of within the 60-day period must be cleared from the contractor's plant, stored, and title to it turned over to the disposal agency in charge of that particular type of material. To speed this process, the Contract Termination Branch of the U. S. Army Corps of Engineers has set up an orderly procedure to help liquidate such items.

When termination inventory listings are received, the Engineers classify the items into separate lists according to type, on the basis of 52 material and equipment classifications. For example, steel items from various termination listings are grouped together on special classified lists, so that they may be sent to interested parties.

Prospective purchasers of such materials may have their names added to the offerings lists of the Engineers Corps. In due time they will receive lists of available items with a specified date by which informal bids must be received from those interested. Bidders can offer to buy single items or entire lots, and must supply a unit and total price in their bids. Location of the material is indicated and inspection is invited. Offerings are made on an "as is, where is" basis, with no guarantees by the government, and material is subject to prior disposal or withdrawal.

When all bids are in they are studied for selection of purchasers. The highest bidder for a particular item may not necessarily be awarded the goods, since in some instances it might be more important to sell out the entire lot, even at a slightly lower bid. If bids are unsatisfactory, all of the items are reviewed for possible scrapping.

Information on available listings can be secured from the Corps of Engineers by prospective buyers upon a formal, written request, enumerating specific materials about which notice of offerings is desired.

AVAILABLE TERMINATION INVENTORY LISTS

Prospective bidders for termination inventory materials can request that their names be added to Corps of Engineers' circulation lists upon indicating an interest in a specfiic category or group of categories of materials, broken down into the following classification files:

1. Apparel
2. Boilers
3. Bolts, nuts, screws, washers, turnbuckles, etc. (General Hardware)
4. Building materials (brick, lime, cement, metal lath, doors, windows, etc.)

4A. Chemicals—acids

5. Compressors
6. Conduit
7. Condulets
8. Containers (barrels, drums, tube, buckets, bags, etc.)
9. Convectors
10. Copper

10A. Cotton textiles

11. Electrical material
12. Electrical wire and cable
13. Explosives and explosion equipment
14. Fans, blowers and ventilators
15. Fence, barbed wire, post, gates, plain wire in coils
16. Fire-fighting equipment (hydrants, hose extinguishers, etc.)
17. Furnaces, stoves, heaters (small)

17A. Furniture, office or household

17B. Gages

18. Generators
19. Heaters, unit
20. Hardware (miscellaneous)

20A. Instruments (indicators)

21. Kitchen and laundry equipment
22. Lighting fixtures
23. Lumber and wood products
24. Machinery and machine tools
25. Medical supplies and hospital equipment
26. Motors (all kinds)

26A. Motor vehicular equipment

27. Nails and staples
28. Office equipment materials

28A. Optical instruments

29. Outlets—convenience
30. Paints, lubricants
31. Panel boards (electrical)

31A. Paper products

31B. Photographic goods

32. Pipe—cast iron
33. Pipe-steel, stainless steel and wrought iron
34. Pipe—transite, clay, concrete, corrugated metal
35. Pipe-fittings (all kinds)

35A. Plastics

36. Plumbing fixtures and equipment
37. Pumps
38. Radiators
39. Railroad rails and accessories

39A. Rigging equipment

40. Road machinery and Equipment
41. Roofing and insulating materials
42. Rope—wire cable, hemp, cordage and guy wire

42A. Rubber and rubber products

43. Steel—shapes, bars, sheets and steel sheet piling
44. Steel—reinforcing bars and wire mesh
45. Switches—electrical
46. Tanks (storage)

46A. Testing equipment

46B. Tools, dies, jigs and fixtures

47. Transformers
48. Traps
49. Tools—small hand
50. Valves
51. Welding rods and equipment

51A. Woolen textiles and rayons

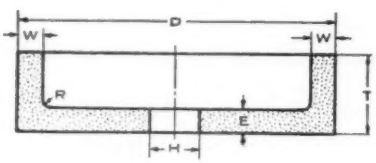
52. Miscellaneous

Grinding Wheels—I

1944 Sectional Revision No. 1, Simplified Practice Recommendation R45-39.

WITH THE CONSENT of the Simplified Practice Division, Bureau of Standards, the Grinding Wheel Manufacturers Association is publishing from time to time "Sectional Revisions" of Simplified Practice Recommendation R45-39, Grinding Wheels. On completion of the revision, the entire document will be submitted to the Division of Simplified Practice for ratification.

The purpose of the *tentative* Sectional Revision No. 1, 1944, is to acquaint wheel users, during the balance of the war and in the reconversion period, with recommendations that have been developed by the Standardization Committee of the Grinding Wheel Maufacturers Association. Of the seven tables incorporated in Sectional Revision No. 1, three are revisions of tables that appeared in Simplified Practice Recommendation R45-39 and four are new tables.

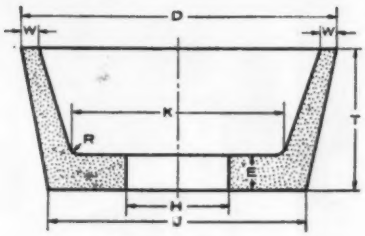


TYPE NO. 6
Straight Cup Wheels (Small)
(Revision of Table 14, R45-39)

D	T	H			W	E
		Min.	Standard	Max.		
¾	¾	⅛	⅛, 3/16	3/16	3/16	3/16
1	1	3/16	3/16, ¼	3/16	¼	¼
1½	1	3/16	¼, ⅜	⅜	¼	¼
2	1¼	¼	¼, ⅜	½	3/16	3/16
2½	1½	⅜	½	⅜	⅜	⅜
3	1½	½	½, ⅝	¾	⅜	⅜
3½	1¾	½	½, ⅝	1¼	⅜	⅜
4	1½	½	½, ⅝	1¼	⅜	⅜
4	1½	½	½, ⅝	1¼	½	½
4	2	½	½, ⅝	1¼	½	½
4½	1½	½	½, ⅝	1¼	⅜	⅜
4½	1½	½	½, ⅝	1¼	½	½
5	1½	½	½, ⅝, 1¼	1½	⅜	⅜
5	2	½	½, ⅝, 1¼	1½	½	½
6	1½	½	½, ⅝, 1¼	1½	⅜	⅜
6	2	⅜	¾, 1¼	1½	½	½
7	2	¾	¾, 1¼	1½	½	½

NOTE: All above sizes can be furnished with standard 30 degree inside bevel with ⅛" flat.

Revision approved by Association June 15, 1944.

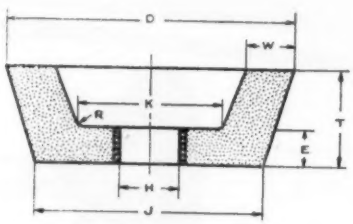


TYPE NO. 11
Flaring Cup Wheels
(Revision of Table 17, R45-39)

D	T	H			W	E	J	K
		Min.	Standard	Max.				
¾	¾	⅛	⅛, 3/16	3/16	⅛	3/16	½	3/16
1	1	3/16	3/16, ¼	¼	⅛	¼	¾	½
1½	1	3/16	¼, ⅜	⅜	3/16	¼	1¼	¾
2	1¼	¼	¼, ⅜	½	¼	3/16	1½	1
2½	1½	⅜	½	⅝	¼	⅜	1¾	1
3	1¼	½	½, ⅝	¾	¼	⅜	2¼	1⅝
3¼	1¼	½	½, ⅝	¾	¼	⅜	2⅛	1½
3½	1½	½	½, ⅝, 1¼	1½	¼	⅜	2¾	2¼
4	1½	½	½, ⅝, 1¼	1½	¼	½	3	2⅝
4½	2	½	½, 1¼	1½	¼	½	3¾	3⅛
5	1¾	½	½, 1¼	1½	¼	½	3¾	3⅛
6	2	⅝	¾, 1¼	1½	⅜	½	4½	3¾
7	2	¾	¾, 1¼	1½	¾	½	5	3¾

NOTE: All above sizes can be furnished with standard 30 degree inside bevel with ⅛" flat.

Revision approved by Association June 15, 1944.



TYPE NO. 11
Flaring Cup Wheels
For Portable Grinders
(New Table, addition to R45-39)

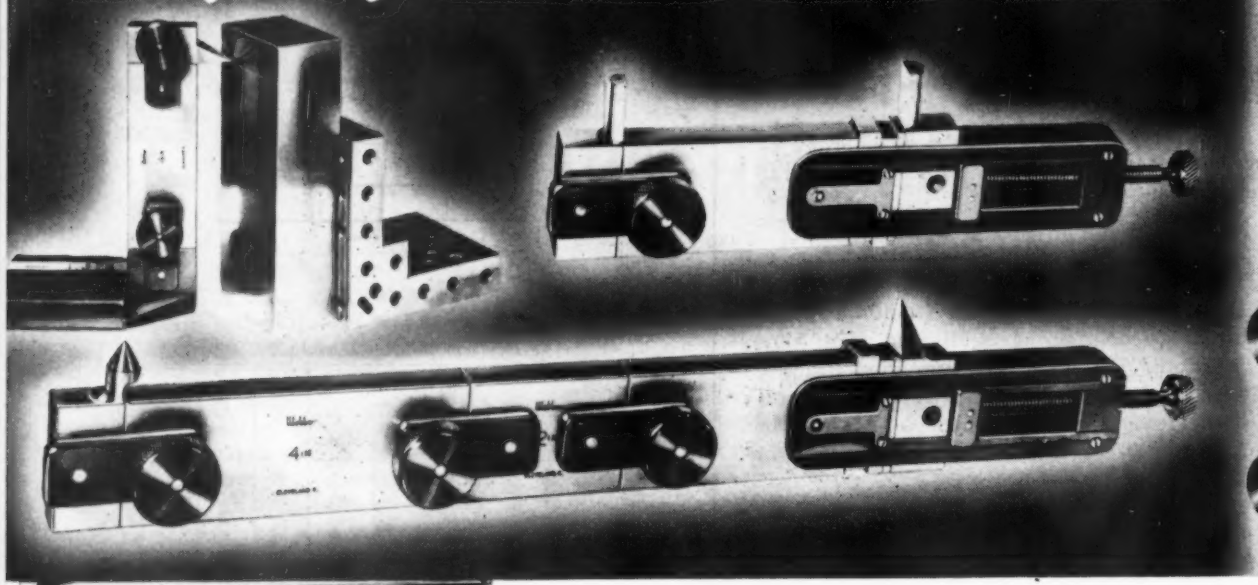
D	T	H			W	E	J	K
		Min.	Standard	Max.				
4	2	⅝	⅝, ⅞	1	¾	¾	3	1¾
5	2	⅝	⅝, ⅞	1	¾	¾	3¾	2½
5	2	⅝	⅝, ⅞	1	1	¾	3¾	2
5	2	⅝	⅝, ⅞	1	1¼	¾	3¾	1½
6	2	⅝	⅝, ⅞	1	1	¾	4¾	3
6	2	⅝	⅝, ⅞	1	1¼	¾	4¾	2½
6	2	⅝	⅝, ⅞	1	1½	¾	4¾	2

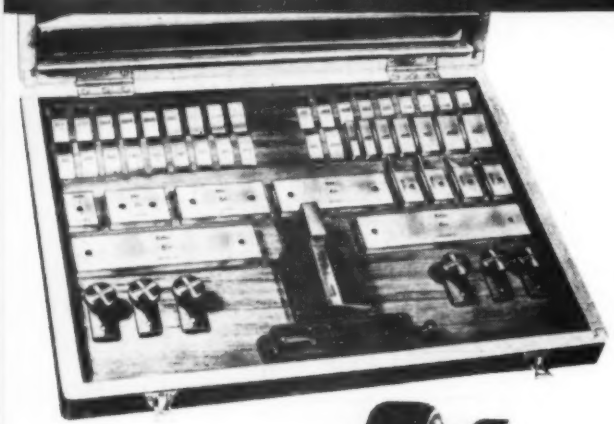
HOLES: Steel or babbitt bushing—⅝"—11 N.C. R.H. Thread.
Babbitt bushing (or similar material) ⅝", ¾" or 1" plain unthreaded.
R—for wheels with threaded holes ¼"
R—for wheels with plain holes ⅛".

SAFETY NOTE: Threaded babbitt bushings are not recommended for tapered cup wheels used on Portable Grinder where speeds are higher than 6500 S.F.P.M.

Approved by Association May 1, 1940.

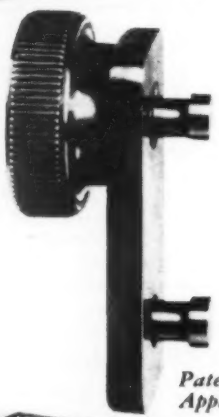
WEBBER
Heavy Duty GAGE BLOCKS



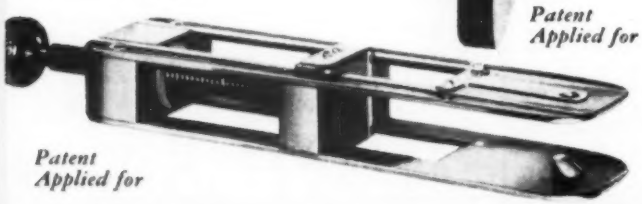


Right—Webber Eccentric Clamp used to unite several blocks quickly into one solid, accurate gage.

Below—Webber Quick Acting Gage Clamp snaps onto the end of any of the long blocks and firmly holds any other blocks necessary to make up the fractions of an inch. Only one of these is required with each set.



Patent Applied for



Patent Applied for

● A handy, complete set of blocks and clamps for making precision measurements up to 36 inches. Additional blocks and clamps available for increasing capacity.

With this set everything you need is in the set. There are no loose pins, screws or small parts which take time to assemble and are easily lost.

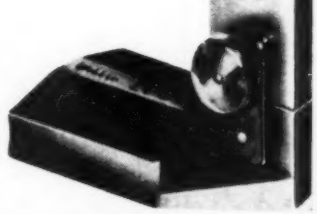
The Webber Eccentric Clamp and the Quick Acting Gage Clamp permit quick, easy assembly of blocks into a unit of precision measurement. There is positively no change in dimension due to clamping action.

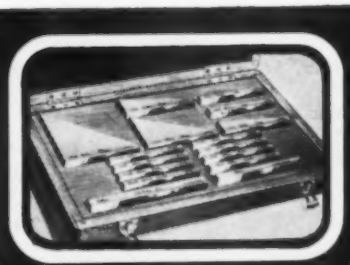
Webber offers two Heavy Duty Gage Sets—

No. 24 Range from .300" to 24.000" in steps of .0001"

No. 36 Range from .300" to 36.000" in steps of .0001"

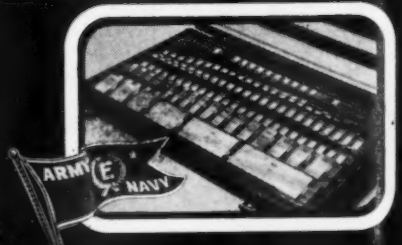
Write today for bulletin illustrating and describing this compact, useful set of gages for precision measuring.





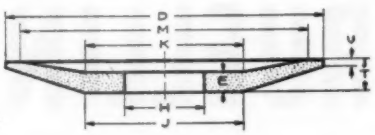
Webber GAGE COMPANY

12901 TRISKETT RD. • CLEVELAND 11, OHIO



Grinding Wheels—II

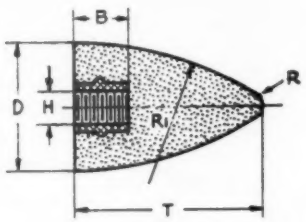
1944 Sectional Revision No. 1, Simplified Practice Recommendation R45-39.



TYPE NO. 12
Dish Wheels
(Revision of Table 18, R45-39)

D	T	H			E	J & K	U	M
		Min.	Standard	Max.				
1½	⅜	¼	⅜	⅜	3/16	⅝	1/16	1¼
2	½	¼	⅜	½	3/16	1	1/16	1¾
2½	½	¼	⅜	⅝	1/8	1¼	1/16	2¼
3	½	⅜	½, ¾	¾	1/16	1½	1/16	2¾
3½	½	⅜	½, ¾	¾	3/16	1¾	3/32	3⅛
4	½	⅜	½, 1¼	1¼	1/16	2	3/32	3⅝
4½	½	½	½, 1¼	1¼	5/16	2¼	⅛	4
5	½	½	½, 1¼	1¼	3/16	2½	⅛	4½
6	½	½	½, ⅝, 1¼	1½	3/16	3	⅛	5¼
6	¾	½	½, ⅝, 1¼	1½	⅜	3	⅛	5¼
7	½	½	½, 1¼	1½	3/16	3½	⅛	6⅛
7	¾	½	½, 1¼	1½	7/16	3½	⅛	6⅛
8	¾	¾	1¼	1½	½	4	⅛	7
8	1	¾	1¼	1½	½	4	⅛	7

Revision approved by Association June 15, 1944.



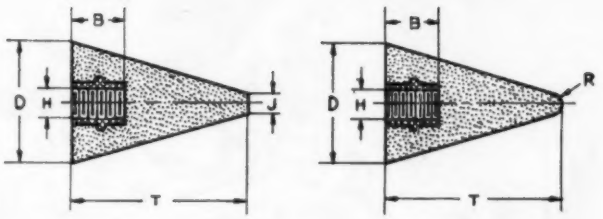
TYPE 16
Standard Cones for Portable Grinders
New Table

D	T	H	B	R	R1
1¼	2	⅜ or ½	⅝	¼	4/8
1¾	3	⅝	1	⅜	7/8
2¼	3	⅝	1	⅝	6½
2¾	3½	⅝	1⅛	⅝	6⅜
3	3½	⅝	1⅛	⅝	5/8

"H" Note: ⅝" steel, babbitt (or similar material) bushings. Tap ⅝"—11 U.S.S. R.H.

¾"–⅞" steel and babbitt (or similar material) bushings. Threaded U.S.S. or S.A.E. as ordered.

Approved by Association May 1, 1940.



TYPE 17 **TYPE 17R**

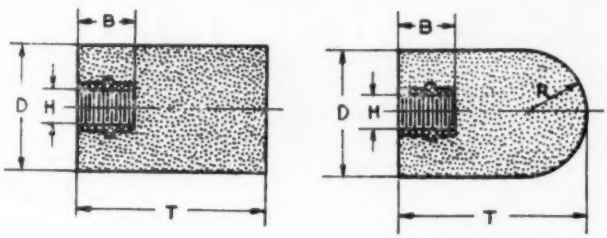
Standard Cones for Portable Grinders
New Table

D	T	H	B	J	R = J/2
1	2	¼ or ⅜	½	⅜	3/16
1¼	2½	⅜	⅝	⅜	3/16
1½	2½	⅜ or ½	¾	⅜	3/16
2	3	½ or ⅝	1	½	¼
2	4	½ or ⅝	1	½	¼
2½	4	⅝	1	½	¼
2½	5	⅝	1¼	½	¼
2¾	3½	⅝	1	⅝	5/16
2¾	4	⅝	1	⅝	5/16
3	3	⅝	1	¾	⅜
3	4	⅝	1	¾	⅜

"H" Note: ⅝" steel, babbitt (or similar material) bushings. Tap ⅝"—11 U.S.S. R.H.

¾"–⅞"–1" steel and babbitt (or similar material) bushings. Threaded U.S.S. or S.A.E. as ordered.

Approved by Association May 1, 1940.



TYPE 18 **TYPE 18R**
Standard Threaded Bushed Plugs for Portable Grinders
(New Table)

D	T	H	B	R = D/2
1	1½	⅜	½	½
1	2	⅜	½	½
1¼	1½	⅜	⅝	⅝
1¼	2	⅜	⅝	⅝
1¼	2½	⅜	⅝	⅝
1½	1½	⅜ or ½	¾	¾
1½	2	⅜ or ½	¾	¾
1½	2½	½ or ⅝	¾	¾
1½	3	½ or ⅝	¾	¾
2	2	½ or ⅝	¾	1
2	3	½ or ⅝	1	1
2	4	½ or ⅝	1	1
2½	3	⅝	1	1¼
3	3	⅝	1	1½

"H" Note: ⅝" steel, babbitt (or similar material) bushings. Tap ⅝"—11 U.S.S. R.H.

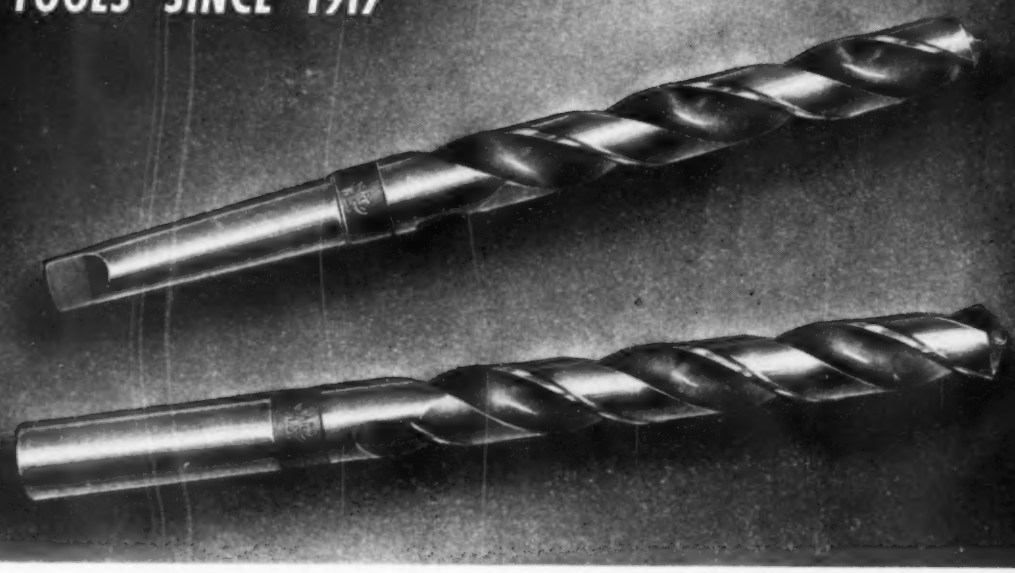
¾"–½" steel and babbitt (or similar material) bushings. Threaded U.S.S. or S.A.E. as ordered.

Approved by Association May 1, 1940.

MEETING WAR'S GRUELLING DEMANDS

ENGINEERS AND PRODUCERS OF QUALITY CUTTING TOOLS SINCE 1917

AMPCO TOOLS



AMPCO TWIST DRILL CO.

JACKSON, MICHIGAN U. S. A.

CHICAGO . DETROIT . CLEVELAND . PHILADELPHIA

Distributors in All Principal Cities

Gaging Business

War Crisis Repercussions

Since the recent increases in the ammunition program were made before the serious German break-through in France, industry can expect greater demands on it to offset materiel losses in European battles, and to provide for what now seems sure to be a prolonged war. Requirements may largely be concentrated in ground forces, items, such as ammunition, guns, mortars, tanks, trucks, and so on.

This will mean step-ups in many plants, whose operations were recently curtailed. In addition, new facilities will be required to lift up the volume of critical items for a few months. In other words, new demands will be urgent and enormous for a short period of time. This will not allow much time to get into high production gear, and may be followed by more severe cuts at the much deferred date when the European War ends.

Tool Backlog Climbs

At the end of November, the tool industry's backlog had gone up to $233,753,000, thanks to another month of heavy ordering and low shipments. At $36,803,000, November's shipments were slightly below the October total of $37,516,000. Yet, new orders in November amounted to $61,158,000, well above shipments, and slightly higher than October's new orders of $61,079,000.

Since the December ordering is expected to be unusually heavy, the chances are that the tool industry has ended 1944 with a backlog of around $275,000,000. The industry still had about 1,500 tools to ship against the old shell program by mid-December. But in addition to that, it is being deluged with orders for two new fuze programs, the medium ammunition and mortar facilities needs, and requirements for the Navy rocket schedule.

Pool Orders Placed

The government has been working on at least $60,000,000 in pool orders to cover the most urgent items in the shell program. However, it is reported that over $100,000,000 in screw machine orders alone may be placed. This would add screw machines to the critical categories of lathes, grinders, and presses.

Meanwhile, WPB reported that the industry's manpower dropped to 54,100 in November from October's 55,000, probably accounting for the drop in shipments for November.

In contrast to this, the increased backlog includes much critical business, on which delivery is required by mid-1945. This backlog alone represents some six months' shipments, not including new critical orders that may have been placed in December, as well as, additional Russian orders being placed.

However, unrated orders make up $46,113,000 of the total backlog, and this stands little chance of delivery for many months. The November shipments against unrated orders totaled only $1,403,000. Russian orders made up $60,809,000 of the total backlog, and November shipments to Russia totaled $2,903,000, as against $3,518,000 in October.

Foreign Plants Enlisted

Some of the manpower stringency in ammunition plants will be eased by release of a small number of men from the Army. These men must be over 30, not overseas or "alerted" for overseas duty. One plant that made shells in Britain has been dismantled and shipped to this country, where it is being set up to help shell production here. The semi-finished materials to feed this plant are close at hand in this country, whereas the materials available in Britain are needed for other war purposes.

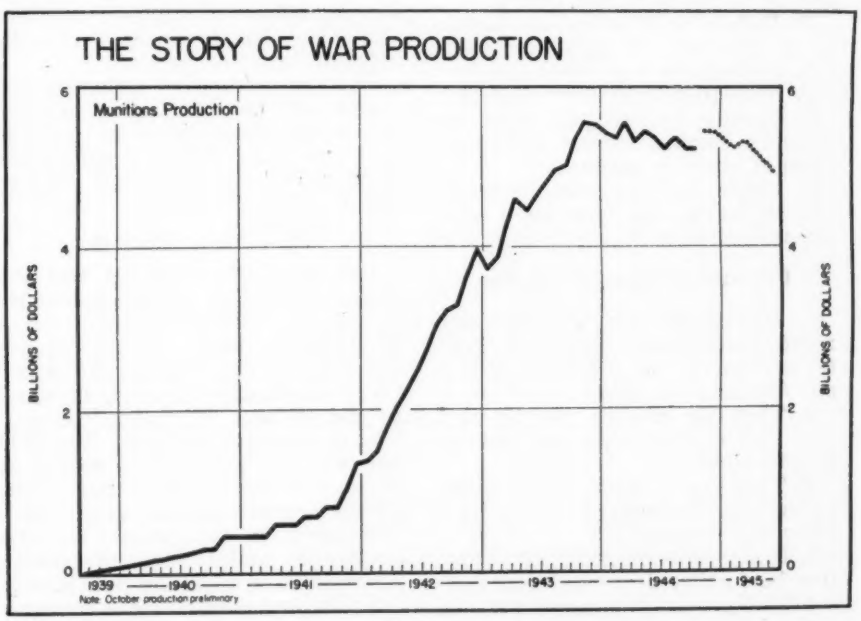
Army has recently surveyed "on the ground" the production of critical items that can be made in France and Belgium for our forces. A considerable amount of goods will be secured in this way, especially tires.

Magnesium-Aluminum Stockpiles

The current magnesium stockpile is over 100,000,000 pounds, while the aluminum stockpile is above 500,000,000 pounds. However, it is reported that these heavy supplies will begin to be whittled away, although slowly over the next few months. Cut-backs in new aluminum production will cause a drain on the stockpile of some 50,000,000 pounds of aluminum monthly, while reduced magnesium production will cut this stockpile at the low rate of 1,500,000 pounds monthly.

Despite this slight improvement in the overall situation, there obviously will be plenty of these metals to meet any unexpected upping in requirements for the plane program. Possible steps of this nature include lifting Liberator production, further upping the B-29 output, or a new jet-plane program.

Nonferrous foundries who had been doing aluminum and magnesium work, are now being allowed to go back to making gray iron castings to relieve the ferrous casting bottleneck. The services say that they are trying to use stampings as much as they can to take the pressure off foundries and forge shops.



The Changing Picture—This is how the war production picture looked before the German break-through in Europe. Chances are that the schedule bulge for the 1945 first quarter will be greater than appears on this pre-crisis chart. Army pressure for more production will be increased

Mead Committee Urges Balanced Procurement By Services

Improved programming would reduce size of surpluses and divert manpower and materials to items more critically needed. Better inventory control, reduced reserves, fewer design changes, and more orderly procurement suggested

WASHINGTON—The Mead Committee to Investigate the National Defense Program has issued its report of the "accumulation of surpluses," and summarized its findings with appropriate recommendations to correct the unbalance in the munition program. The Committee flatly stated, "The accumulation of surpluses inevitably has hindered balanced war supply. The manpower and materials which went into surpluses could have been used to produce more urgently needed items, the scarcity of which has impeded the progress of the war."

Declaring that many of the surpluses could have been "prevented or reduced," the Committee cited these causes for the accumulation of surpluses:

1. Failure to forecast requirements.
2. Changes in design.
3. Failure to standardize.
4. Duplication of procurement.
5. Procurement which has been poorly timed, indirect, and poorly controlled.
6. Keeping production lines going where adequate stocks are on hand so that the productive capacity will be available at a future time when greater demand is anticipated.
7. Failure to develop and utilize more fully interchangeability data.
8. Setting too high stock levels.
9. Inadequate inventory control.
10. Failure to recognize and declare as surplus useless accumulations of obsolete material.
11. Other failures and inefficiencies in the various successive functions comprising the supply pipe line.

Committee Recommendation

In view of these findings, the Committee recommends that the services try to improve the efficiency of supply functions as follows:

1. That like articles used by various service branches be further standardized.
2. That procurement of like items be further centralized in one procurement agency.
3. That interchangeability information be further developed and used.
4. That procurement officers should not rely upon taxes and renegotiation to cover up failure to make a good bargain for the government.
5. That handling of transportation and warehousing be improved.
6. That inventory and stock control be improved, and that liaison between officers estimating military requirements, those in charge of inventories, and those in charge of procurement be improved.

"Too Much" Too Much

The committee concedes that this "colossal" job could not have been perfect, and that it is impossible to forecast military developments. It recognizes the difficulty of estimating requirements, the need for reserve, and it does not object to having too much of some items. But it adds that it has seen too many examples of "too much too much."

The committee declared that it found the Army "very loathe" to declare surpluses, even though these surpluses were above what the Army considered as "excess."

Interchangeability

In showing what could be accomplished via more standardization, the committee pointed out that the Ordnance Department had reduced the number of types of bearings required for Ordnance vehicles from 15,000 different bearing numbers down to 1,700 different types, after a study on interchangeability. Such interchangeability reduced the types of bolts, nuts, and screws to 755 from 3,944, tubing fittings from 1,257 to 120, and storage batteries from 708 to 51.

The committee scored the Army on overbuying, referring to the War Department's recent release of 23,000,000 surplus flashlight batteries. On the other hand, the committee commended some concrete corrective steps that the services had taken, citing the Army reduction of stock levels at depots from 90 days' supply to 60 days' supply, while stock levels at posts, camps and stations were cut to 30 days from 45 days.

New War Crisis May Not Require More Ordnance Items — Campbell

CLEVELAND—The national ordnance program, twice accelerated during 1944, is unlikely to be changed as a result of current developments in the war in Europe, it was agreed at a meeting here of ranking officers of ordnance districts with Maj. Gen. Levin H. Campbell, chief of Army ordnance.

The pyramiding of ordnance requirements last November, to meet the needs emerging from the experience of Gen. Eisenhower's Armies, will not reach full production till next September.

New Brass Project

Indicative of the needs was the almost coincident announcement by the War Production Board of a $3,500,000 addition to the Euclid plant of the Chase Brass & Copper Co., Inc., adding 13 electric furnaces to the present 20 there. Completion is projected by June. The 1000 new workers who will be needed at Chase pose the problem that afflicts all the urgent ordnance programs.

Employers in war industry report a substantial back-to-plant movement, however, accompanying the German offensive and publicizing of ammunition and other shortages.

Absenteeism Continues

Data submitted to the War Manpower Commission by 144 companies showed time lost by absences in October to range from around 5% to 12%, no substantial change from previous surveys.

These companies, employing nearly 215,000 persons, 70% of the war workers in Greater Cleveland, had a turnover in October of 16,273 workers. Considering Cleveland typical of tight labor areas, WMC officials said these figures could fairly be projected to cover all industry, and represented a national loss of 6,175,000 man-hours a month.

No Front-line Shortages

Gen. Campbell discounted the more hysterical appeals for greater production which would give the impression that American gun crews were on half rations because of ammunition shortages. Echoing the assurance of other ranking military leaders, he said he knew of no case where our armies have been held up for lack of sufficient weapons and ammunition. He emphasized, however, that the rate of consumption was far in excess of previous estimates and that increased production was vital to victory.

Gen. Campbell said some "V-3" and "V-4" German rockets were now undergoing examination after capture. He described the Germans' vaunted new secret weapon as a varient of the V-2 wingless rocket, but smaller because of the shorter range at which it is being used.

Wartime Washington

The "Wolf" Shows Up

Right in the midst of speculation over the accuracy of the Army's claim of a serious ammunition shortage, the sudden reversal in Europe now justifies the Army's alarmed view. Not only will more ammunition of all types be needed to replenish captured and destroyed equipment, but additional quantities will probably be needed to put the initiative back into Allied hands and keep it there.

WPB chairman Krug made it clear that estimates on the duration of the war had been lengthened and that many programs would be upped. He pointed out that one of the first repercussions of the European crisis was the increase in the 1945 plane program to 78,227 planes from the previous level of 75,610 planes. The biggest increase was to be in Army and Navy fighter planes, while the B-29 program was also being increased sizably. Krug gave favorable reports of his visit to the West Coast, and said that he could not find "any complacency" among workers there.

Army Running Show

Since the Army had apparently scored a victory over WPB on the "spot authorization" program before the latest European set-back, there is little question but that the Army will continue to hold the reins. However, there is now more justification for this than before, in the opinion of many observers. In any event, the serious war situation leaves little room for much to-do over the halting of the spot program in 126 leading areas for 90 days.

Since WPB's publicity policies, under dictation by the Army, had been designed to feature the bearish side of the war production story and to play down the good news, it is likely that a different pattern may soon appear. Certainly, it will be advisable to feature some good news in coming months to offset the serious war news.

Meanwhile, it may be expected that the Army will tighten manpower controls as much as possible, and take other restrictive steps.

Manpower Shortage Aspects

Despite the widely-quoted 300,000 figure in government discussions of manpower shortages, insiders say that the actual "current" shortage is 140,000 men, and even this figure cannot be justified to the complete satisfaction of some labor experts.

The Army is releasing 4,700 soldiers to go to work in war industries, as follows: 3,000 to artillery and mortar ammunition production; 1,200 to tire plants; and 500 to cotton duck plants.

Meanwhile, the mid-December cutback in airplane machine-guns will release 6,000 workers. Other cuts which will release smaller numbers of men include the reduced landing-mat program, the lowered requirements for steel for "Bailey Bridges" used by the Army, and reductions in the number of auxiliary gas tanks needed for combat planes. More critical war work is now being performed in these same plants.

Surprising angle to the labor shortage announcements was the mention of "lead and copper mines". The stockpiles of both metals in all forms have been seriously discussed in recent months, and any plan to include manpower needs for mines only to help increase our stockpiles seems rather questionable in view of the severe labor shortage elsewhere.

Surplus Board Developments

Congressional approval of Robert A. Hurley and Edward Heller as two members of the Surplus Property Board, now leaves only the approval of former congressman Gillette to complete the three-man board. Until these men take office, the Surplus Property Board is being run by Mason Britton, who has been appointed Surplus Property Administrator. Eventually, the staff of the board is expected to run above 1,000.

The Army found that it would be able to use several DPC-owned plants for its medium shell and mortar program, so that the initial estimate of a $500,000 construction program has been cut to around $275,000,000 already. At the same time, it is reported that the Navy has taken over the giant aluminum plant at Maspeth, Long Island, N. Y.

As slow as surplus tool declarations by the Army had been before the current military crisis, it is now expected that conditions will slow up declarations even further. On the other side of the ledger, many officials miss the "available tools" list which the Tools Division and the Redistribution Division used to carry accurately on a week-to-week basis. This list showed idle tools or idle capacity, and was used in many emergencies. Dissolution of the Redistribution Divison hampered this activity from being continued by the DPC, now having responsibility.

Steel Programming

Steel plate requirements for the Maritime Commission are set at 350,000 tons for January, 150,000 tons for February, and 100,000 tons for March. This will cut over-all plate production from its recent 1,000,000-ton monthly level down to about 500,000 tons by March. This will ease the sheet situation in the second quarter, but only to a smaller extent than the reduction in the plate tonnage, due to limitations of rolling mills and labor shortages. The steel industry currently lacks 50,000 men, according to WPB.

The Steel Division is clamping down on stainless steel, due to the current cutting of the 7-month stockpile of chrome ore. Right now the diversion of shipping for military reasons will reduce imports of ore, and WPB is trying to conserve the chrome supply by restricting its use in stainless steel.

Unanswered question making the rounds in Washington is: Why aren't the steel shell casings being revived to help out the expanded munitions program in view of the tight situation at the brass strip mills?

Mansized Shells— The Navy's expanded shell and rocket program includes the 16-in. and 14-in. shells, shown here, for use by U. S. battleships

Employees Approve Ford Retirement Plan, First in Automotive Industry

DETROIT—The Ford Company put into effect the first employee retirement plan in the automotive industry on December 30, 1944. The first group covered will be the salaried workers who earn $3,000 a year or more, but the company's plan is that this will shortly be extended to all their employees, hourly rated and salaried.

The "white collar" workers were given a chance to vote on the retirement plan before it was finally put into effect. While Washington must also approve the plan, the company doesn't expect any obstacles on that score. So far, the acceptance by employees has been almost unanimous. The workers themselves contribute part of the retirement funds, but the company pays more than half of the cost. The worker's share is five percent of his income in excess of $3,000, but a minimum of two percent a month.

Ford Also Contributes

In addition to putting in the future benefits, the company also adds to the fund by giving the workers who have been in the Ford employ for more than six years three-quarters of one percent of their earnings over $3,000 for their entire service exclusive of the first five years. Thus, a worker whose salary is $5,000 annually with 25 years of service will have added to his annuity fund $300.

May Retire at 55

Retirement age is 65. Those who desire to retire before 65 may have their retirement annuity begin any time after 55, but in a reduced amount. If an employee dies before reaching the retirement age, the beneficiary will receive the total contributions to the plan by the employee and the company, together with accumulated interest. Upon the death of the employee after retiring, the beneficiary will get any excess amounts remaining in the fund over the premiums already paid. Should a worker leave the Ford company, he has the option of leaving his contributions to the plan in the fund and receiving on his retirement date the total annuity purchased up to the time he left the company, or he may have his contributions returned with interest.

"Work-or-Fight" Policy May Check West Coast Labor Exodus

LOS ANGELES—It appears that the new work-or-fight policy, under which status of war workers who quit their jobs will be reviewed by their draft boards, may go a long way toward solving the manpower problems of shipyards, and to somewhat less extent those of the aircraft factories.

On the first day under the new policy one yard reported a mere 2 terminations compared to a previous daily average of 50. In another yard more than 100 proposed terminations were withdrawn. Other yards and the aircraft factories reported a sharp drop in "quit" rate, and an increase in applications for employment. Offices of the U.S.E.S. also reported an increase in applications.

However, the new policy is probably not wholly responsible. An improvement had been noted before the new policy was adopted. New workers are again coming or returning to war work in Coast plants. Out of some 8,000 "quits" in the month of October in Southern California, some 5800 said they were leaving the state, and of the approximately 8,000 replacements that were secured, some 5,600 came from without the state.

Regardless of all policies, employment in war plants waxes or wanes primarily according to mass opinion as to whether the end of the war is imminent. The fear of being "stranded" in a suddenly-shutdown war plant is a very real one to most workers.

Farm Machinery Cooperative Will Add Tractors to Line

CLEVELAND—National Farm Machinery Cooperative, Incorporated, already manufacturing a variety of agricultural implements, has announced designs for a full line of tractors of rpostwar manufacture. The tractors will be made at the Co-op's Shelbyville, Ind., plant, and the manufacture of cultivators, haying machinery, disk harrows and other equipment will be continued at the 350,000 sq. ft. Bellevue, Ohio, plant, acquired from the Ohio Cultivator Co.

National Farm Machinery Cooperative has 15 shareholders, large regional co-operative wholesalers, three of which are in Canada, the others in the south and midwest. H. L. Fowler, general manager, said present capacity of the two plants is hardly sufficient to meet the farm machinery requirements of any one of the 15 shareholders.

CANADIAN TOOL RESTRICTIONS ENTIRELY REMOVED

OTTAWA—All restrictions on the sale of Canadian machine tools have been removed, according to an announcement by the Munitions and Supply Department. At the same time, Munitions Minister Howe announced the resignation of Thomas Arnold as Machine Tools Controller.

Minister Howe stated, "All orders covering machine tools have been rescinded, and we do not believe it will be necessary to issue further orders covering their sale and distribution.

Army Adopts Repricing Screening For All Items

WASHINGTON—The War Department has adopted a comprehensive program of reviewing prime contract and subcontract prices, by which company pricing teams will examine price policies of all companies now subject to renegotiation, and some companies which are not. The objective is to adjust prices in advance, rather than depending on renegotiation to recover excess profits for the War Department.

The War Department stated, "War goods manufacturers whose prices are too high, or are yielding too much profit will have to set closer prices and tighten their control of costs in the coming year." The War Department further expressed the belief that this program will promote increased efficiency by providing manufacturers with incentives to lower costs.

Observers believe that adoption of this repricing policy was partly due to the pending expiration of the renegotiation privilege at mid-1945, unless extended by Congress. Accordingly, the services are seeking some protection against criticisms on procurement by this repricing program.

ASSISTANT EDITOR WANTED

Wanted—An assistant editor for American Machinist. The man qualified to fill this position must be familiar with shop tooling and metal-working operations in general. He should be able to identify practical improvements in machine shop set-ups and to describe them clearly. Interested applicants communicate with the Editor, American Machinist, 330 West 42 Street, New York 18, N. Y.

Inside Detroit

1945 Demands Rising

Detroit opens the year 1945 with increasing, instead of decreasing demands on its far-flung auto empire. Contracts are coming into the plants in amazing numbers and astronomical figures.

They are not only for more of the same which are being turned out now but for redesigned and improved products and many new ones. Just as the B-29 program spread all over the Detroit area, jet propulsion and robot bombs may come into the picture very strongly early in the new year.

Then, of course, there are the secret weapons, about which the services will not talk. Prominent is the new and larger tank that Chrysler and Fisher Body division of General Motors have started in production. When Ordnance is ready to talk about these heirs to the General Shermans and the General Grants, there will be an amazing story of design improvements, greater fire power, more mobility, better protection, wider range of operations.

Long-range Planning Seen

So great are the demands now and in prospect on the automotive plants that new construction is now in the process of being authorized. The "hot" programs will be augmented by more facilities.

The very fact that new construction is being authorized by the War Production Board shows that the services are in long-range planning mood. After all, these new facilities will not be ready for at least three or four months and then an additional two or three months will be necessary to tool up.

Services Appreciate Wait

By the time production is under way it will be nearly September, it is estimated. But that doesn't seem to worry the services at all. They are ready to accept the products at that time, they have informed the manufacturers. But the latter are actually planning on giving them production from the new facilities by June.

The new construction will house facilities mainly for small arms ammunition and mortar shells. It isn't hard to remember how little time back the ammunition program was cut to the bone. It has been revived quickly but the additional demands, especially for mortar shells, has necessitated plans for additional construction.

New "General Jackson" Tank—The M-36 "General Jackson" tank destroyer is now being produced by the Fisher Body Division of General Motors. A sequel to the M-36, used by the Allies in France, the "General Jackson" mounts a 90-mm cannon in its heavy open turret on an M-4 hull.

Truck Production Hit

Truck production, the only semblance of civilian output in the automotive plants, will suffer another setback in 1945. Military requirements, plus shortage of tires, make it almost certain that civilian trucks will be scaled down in all classes.

Especially hard hit will be the light-heavy class. It is expected to be reduced by 25 per cent. The heavy-heavies will be scaled down 12 per cent and the other classes correspondingly. The effect will not be felt in the first quarter, but thereafter civilian trucks will be hard hit.

Truck Lag 5%

Estimates now in the hands of the War Production Board show that the over-all truck output, both civilian and military, finished 1944 only 5 per cent behind schedule, despite dire predictions. Civilian off-the-highway vehicles were the hardest hit, falling 26 per cent behind. Next were the light-heavies, 12 per cent off schedule, with the commercial heavy-heavies 10 per cent down and mediums 2 per cent. The light trucks were right on schedule.

Plant Clearance Improves

Plant clearances, while having lost their prime importance to industry because of renewed war activity, are being watched closely by the services to see what can be done to speed them in preparation for the time when they will again make the difference between full and partial employment.

That is why the Central District of the Army Air Forces recently gave publicity to the fact that the turbo-supercharger plant at the Ford Motor Car Co. had been cleared in only 28 days from the time that the old contract was completed. The $17,000,000 contract was replaced by another for droppable gas tanks, in the same space.

Cooperation Required

The AAF credited rapid clearance to cooperation between the company and the terminations officers, who worked on the clearance. Inventories were made efficiently, decisions were made quickly on disposal of finished parts, parts in process, tools, machines and jigs. As the old machines were moved out, the new ones for the fuel tanks moved in and production began.

In contrast was the Ordnance Department's struggle to clear the Ford Highland Park plant after the tank contract there was terminated. While the size of the clearance was much larger in this division, the time difference was far out of proportion. It took nearly a year to clear 30 acres of accumulated material and machinery.

Spotting the Air News

Jet-turbine Power

Lt. Gen. Burton K. Yount, chief of Army air training, recently stated in a public address that in his opinion no more fighter planes will be designed to use conventional gasoline engines. Gen. Yount believes designs for the future will be equipped with jet-turbine power plants. Of course the armed services have in process several fighters to be powered with reciprocating engines, which still have not been mentioned publicly. Some of these might go into production and into action if the war lasts long enough. General Yount means that he thinks all new fighter conceptions, from now on, will be jet propelled.

Dr. George Lewis, director of research for the National Advisory Committee for Aeronautics, told the House Appropriations Committee recently that a very large number of jet turbine types of aircraft are under development by Army and Navy, and he showed some of them to the Committee. Neither private aviation nor air transport is yet showing immediate interest in jet power, but they believe it will be applied to all types of flying in the course of years.

Reversible Propellers

Reversible pitch propellers seem to have a secure position in the immediate future of both military and civil aviation. The Air Service Technical Command at Wright Feld has announced that reversed pitch used as an aerodynamic brake in addition to regular brakes, made it possible to stop a heavy airplane in 900 feet after contact with ground. Using its brakes and flaps, this same plane requires a run of 1500 feet after contact. It rolls 6000 if not retarded by any form of braking. Experimentation with reversible pitch propellers has been going on for many years, but was not pushed until recently, because the successful application of wheel brakes to retractable landing gears solved the problem so far as pre-war planes was concerned. Reverse pitch is used also to maneuver seaplanes in the water, and it might be useful for slowing down in combat maneuvers aloft.

Plane Output Drops

Unit aircraft production dropped from 7429 in October to 6747 in November. J. A. Krug, WPB chairman, explained that the lag was due to design changes and to Thanksgiving holidays. The schedule for November was 7000. November unit output established a new low since the high point last March, when units produced totaled 9118. Part of the downward trend during those seven months was due to Army and Navy cutback orders, and were not taken seriously. Now, however, all of the planes in production are really needed.

B-29s Urgently Needed

The need for B-29 Superfortresses to hit Japanese war production is most urgent. Plants at Omaha and Wichita are on schedule, Atlanta is a little off, and Seattle is having trouble due to labor shortage and rapid turnover, combined with conversion from B-17s to B-29s. But double the present output is hoped for—no amount would be enough—and the seemingly impossible task is to meet increased future quotas. Design changes will continue to hamper output; the only hope is to bring more manpower to the jobs. Consolidated is having the usual new-plane worries with the B-32, running mate of the B-29. Mr. Krug said the output of four-engined transports, three types of Navy shipboard planes, a torpedo bomber, and two patrol planes was behind schedule, and disappointing.

More Air Research

The pressure is on from every direction for continued intensive aeronautical research after the war. The Civil Aeronautics Administration is asking Congress for funds to renew its development work on light planes. National Advisory Committee for Aeronautics wants money to continue long-range engine and aircraft research in its three vast laboratories. Maj. Gen. Oliver P. Echols, Assistant Chief of Air Staff, recommending replacement of one-fourth of AAF equipment each year for five years after the war, says that aircraft manufacturers should maintain large and competent engineering staffs on development of aircraft in peacetime. Many observers doubt whether a strong research program can be carried on after public attention turns to peace business, but it certainly will be tried.

Postwar Amphibious Plane—Although Republic Aviation Corporation is busy turning out P-47 Thunderbolts, its engineers have designed this all-metal high-wing amphibian, aimed to sell at less than $4000. The postwar plane will accommodate four passengers and is powered by a single 175 hp. engine

LINCOLN ELECTRIC, JACK & HEINTZ PAY $9,000,000 BONUS

CLEVELAND—J. F. Lincoln whose celebrated system of incentive pay in his Lincoln Electric Co. has brought him wide attention and some squabbles with the Treasury Department, distributed the customary $3,000,000 in year-end pay to 1100 workers last week.

The Jack & Heintz Co., which vies with Lincoln for public interest in its methods of distributing employee benefits, paid between $5,000,000 and $6,500,000 to 8800 "associates," $50 for each month worked during the year and from $500 to $12,500 for "especially valuable" services. It matched last year's bonuses.

Lincoln paid amounts ranging from $150 for new workers to $40,000 for workers whose "contribution to the business was outstanding." All except Lincoln himself and the board chairman share the payments. Directors set the total amount. Lincoln divides it. Average to employees was $2,500 over base wages, with 90% of the total sum going to factory workers.

Coast Labor Steadying; Postwar Plans Divulged

LOS ANGELES — Although the labor situation on the Coast is still critical, there are some encouraging signs. Industrial employment in California has reached a new two-year low, but the rate of decline is much lower than a few months ago. Migration, and "quitting" by women, both seem to be less. Moreover, when the contrary might have been expected, it is reported by WMC officials that absenteeism in Los Angeles war plants was lower in November than in October.

Reconversion Halt Helps

The action of the government in stopping reconversion in areas of labor shortage was probably more helpful in its general effect of stopping the impression that war work is about over than it was in any specific way, because reconversion has been so small in this area, and so hedged by manpower restrictions, that it has had little effect on the shortage of labor for war work.

GE in Plastics

General Electric's announcement that it will build and operate, postwar, a Southern California plant for the production of plastics, is being welcomed by those who argue that development of a strong position in the plastics field is one way in which the West can retain its war-won industrial gains. It is pointed out that materials, vegetable and mineral, are available from Coast and trans-Pacific sources; that the West is well supplied with electrical power; and that marketing and transportation advantages will accrue if plastics are widely substituted for metals in fabricated goods that were, prewar, bought largely from eastern manufacturers.

Similar announcement by the Aluminum Company that it would operate, postwar, on the Coast, possibly using bauxite imported from the Orient, is also hailed as another step to crack the steel-freight obstacle to western industrial progress.

Coast Steel Position

Efforts to sustain and continue in production the western steel mills, Fontana and Geneva, now being operated, will not be dropped, but an interesting indication of the position in which these mills, newly built and handicapped by fairly long hauls for their basic materials, might possibly find themselves, postwar, is found in the fact that OPA recently authorized the Kaiser Company to sell billets and shapes at $12.00 per ton above Pacific Coast ceilings, because the plant has been operating at a loss.

Standards Expansion Forecast To Cope with Postwar Needs

NEW YORK—A big postwar future for standards in the consumer-goods and other fields, as well as in the technical field, is forecast by Henry B. Bryans, president of the American Standards Association. Executives of trade, technical and governmental groups attending the ASA annual luncheon on Dec. 8, heard Mr. Bryans assert that there is a need for international as well as national standards, to promote the free flow of mechanical and other goods to scores of countries.

In 1944, Mr. Bryans reported, the ASA broadened its scope to handle standardization projects in the fields of accounting, business practice, consumer goods, as well as engineering subjects, and agreed to place special emphasis upon work relating to consumer goods. This move was taken after the Department of Commerce showed interest in taking over standardization activities. In fact, a meeting to consider consumer-goods standardization is scheduled for Jan. 12 under the auspices of the Department.

1944 Record Year

In reporting on standardization activities of the body for 1944, H. S. Osborne of the Standards Council reported promulgation of 157 items, the greatest number of record for a single year. Of these, 66 were handled under the emergency procedure established for war standards. Twenty-seven of the war standards relate to worker safety, 25 take up photographic subjects. In regard to standards carried out under regular ASA procedure, the largest group, 38 in number, covered specifications and tests for material as submitted by the American Society for Testing Materials.

Offiicers Re-elected

Officers of the ASA were reelected for another term. They are: president—Henry B. Bryans, executive vice-president and director of the Philadelphia Electric Co.; vice-president—George S. Case, chairman of the board, Lamson & Sessions Co.; chairman of Standars Council—H. S. Osborne, of the American Telephone Co.; vice-chairman, Standards Council—E. C. Crittenden, National Bureau of Standards. P. C. Agnew was honored for 25 years of service as ASA secretary.

Names in the News

H. G. Batcheller

G. W. Mitsch

Hiland G. Batcheller who has been with the War Production Board since 1942, has been named chief of operations of the board. Mr. Batcheller, formerly of Allegheny-Ludlum Steel Corp., has been operations vice chairman since September. His former position will be filled by **Harold Boeschenstein** of the vice chairman's office.

George W. Mitsch, since 1935 assistant manager of foundries of the Madison and St. Louis plants of American Car & Foundry Co., has been appointed operating manager of all a.c.f. foundries. Mr. Mitsch has been with a.c.f. since 1913 when he started as a patternmaker apprentice in the St. Louis foundry.

William B. Todd has been named director of the War Production Board's Steel Division to succeed **Norman W. Foy**, resigned. At the same time, **Harry M. Francis** of Cleveland, Ohio has been appointed deputy director of the division.

George C. Ford has been appointed works manager of Consolidated Vultee Aircraft Corporation's Field Div. In his new position, Mr. Ford will have charge of all production at the plant, which is currently engaged in the manufacture of major assembly units for the new B-32 Dominator "super-bomber", the B-24 Liberator, the PB4Y naval patrol bomber and the Lockheed P-38 fighter plane.

John H. Middlekamp of Rockville Centre, N. Y., head of the automotive division of the War Production, has resigned.

H. E. Hardenbrook

Harold E. Hardenbrook has been named general works engineer for all Buick plants to succeed **Frank Elwell,** who is retiring. Mr. Hardenbrook has been with Buick since 1917 and since the Fall of 1940, he has been works engineer at the Buick Melrose plant in charge of plant engineering and maintenance.

R. A. Williams, American Car & Foundry Co. vice president since 1943, has been placed in charge of sales for that company succeeding **William L. Stancliffe,** who recently resigned. Mr. Stancliffe will remain with the company as a consultant and as a member of the board. Mr. Williams, who has been associated with the company since 1924 when he entered the engineering department at the St. Louis plant, has been Mr. Stancliffe's chief assistant.

H. B. Heberling, formerly staff executive of the Plymouth div., Chrysler Corp., has been appointed assistant sales manager.

Fred T. Kennedy has been appointed general manager of the Blackmer Pump Co., Grand Rapids, Mich. Until recently, Mr. Kennedy was connected with the W.P.B.

George E. Rittenhouse, formerly of the Peter A. Frasse Co., New York, has been appointed sales manager of the A. R. Purdy Co., Inc., New York.

Milton Annich has been appointed superintendent of standards of all American Brake Shoe Company's nine divisions. Mr. Annich has been with the Brake Shoe firm for 11 years, with a two year absence when he served in the armed forces.

W. F. Kurfess has been appointed manager of the Milwaukee plant of Joseph T. Ryerson & Son, Inc., succeeding the late **George W. Smith.** A former executive of the Ryerson firm in Chicago, Mr. Kurfess has been on active duty with the Navy since September 1941.

OBITUARIES

Jesse H. VanAlstyne, president of the Otis Elevator Co., died December 25 at the age of 72. Mr. VanAlstyne, president of the firm for the past 22 years, started about 40 years ago with the company as construction man and elevator mechanic.

Charles F. Loughead, 63, president of the American Transformer Co., Newark, N. J. for five years until his retirement in 1934, died December 23.

Peter J. Mulvey, master mechanic and electrician, who had served the General Electric Co. for 42 years, died in Schenectady, N. Y. on December 11 at the age of 70. Mr. Mulvey was located in the Schenectady and Erie, Pa. plants of the company until his retirement in 1933. One of the more important accomplishments of his career included the invention of a sparkless brush, which is now a necessary part of every motor.

Constant K. Decherd, 77, passed away December 10. Mr. Decherd had been with the International Silver Co. for the past 63 years. He served for 40 years as master mechanic in one of their plants.

BUSINESS ITEMS

Pullman, Inc., has acquired the entire stock of the **M. W. Kellogg Company,** petroleum and chemical engineers, in a move to broaden the company's activities, and offset the loss of its sleeping-car business. **M. W. Kellogg,** president of the engineering company, has been elected a director of Pullman, Inc. The Kellogg unit will be operated by Pullman as a separate subsidiary with its present staff.

The Eastern Machinery Co., Cincinnati, Ohio has opened a branch office in the Chrysler Bldg., Lexington Ave. & 42 St., New York, N. Y. The office is under the management of **John W. Lerew,** who for more than four years was in charge of the purchase and redistribution of used machine tools for the British Purchasing Commission and was also technical advisor on problems relating to the selection and use of machine tools for the British and India Supply Commissions.

The **Redistribution Service Co.,** 1222 Connecticut Ave., N. W., Washington, D. C. has been formed by **C. W. Thomas,** former head of the Equipment and Machinery Branch of W.P.B.'S Redistribution Div., and **E. F. Hawkins,** in charge of service activities of that branch. The new company will be devoted to locating all types of idle or surplus equipment and machinery or materials for industrial organizations and representing these organizations in negotiations leading to the purchase of such items from government surplus or dealer sources.

T. A. Stiffel Co., 615 No. Aberdeen St., Chicago, Ill., has changed its company name to **Stiffel-Bradley Co.**

Bethlehem Steel Co. has acquired the **Pacific Coast Forge Co.,** a bolt and nut plant, with a factory in Seattle and general offices in Spokane. The company will continue serving the Pacific Northwest.

Carboloy Co., Inc., Detroit, Mich. has opened a branch office in Milwaukee, Wis. at 743 No. Fourth St. **Frank T. Staroba** and **A. F. Schlumpf** will make their headquarters in this new office. A branch office has also been established in the South Texas area at 924 M & M Bldg., 1 Main St., Houston 2, Tex. where **A. J. Rod** will be in charge.

Clayborne Distributors, Ltd., 209 So. LaSalle St., Chicago, Ill., is being formed as a selling pool among small manufacturers who wish to participate in foreign trade. **Norman F. Clayborne** is president of this firm which is being encouraged by the government as a partial solution to the surplus war goods problem.

Harry Schenkel, Earl Adams and George Wallace have filed articles of incorporation in Indiana for the **Continental Machine & Tool Co.,** 202 W. High St., Liberty, Ind. The firm has been formed to deal in machine tools of all kinds.

MEETINGS

American Management Association, Annual Personnel Meeting. Palmer House, Chicago, Ill. Feb. 14-16. J. O. Rice, 330 West 42 St., New York 18, N. Y.

American Society for Testing Materials, Spring Meeting. Hotel William Penn, Pittsburgh, Pa. Feb. 28. Robert J. Painter, Assistant to the Secretary, 260 So. Broad St., Philadelphia 2, Pa.

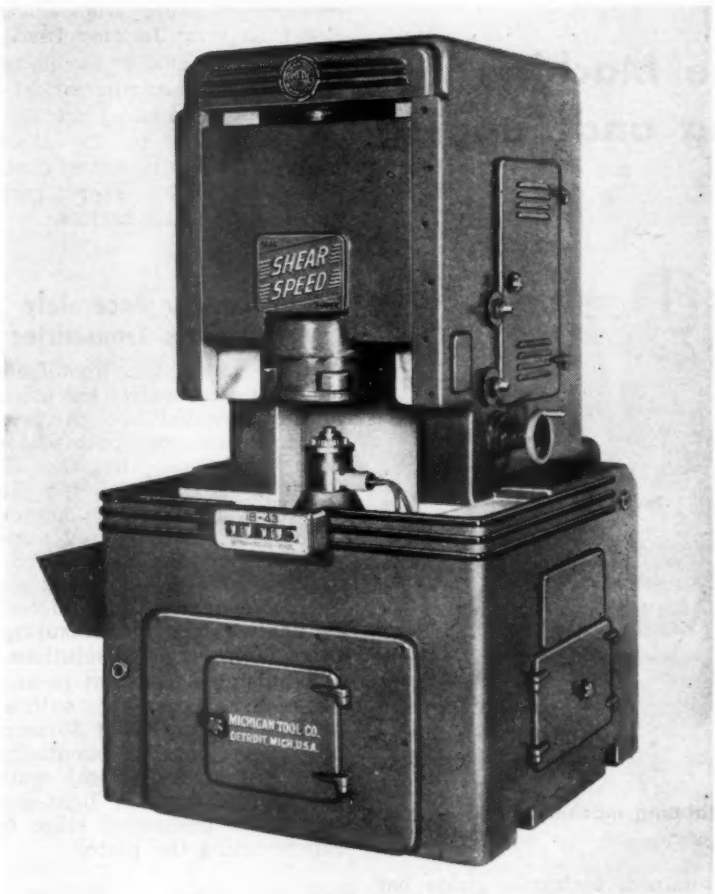
National Screw Machine Products Association. Annual Meeting. Schroeder Hotel, Milwaukee, Wis. Jan. 24-26. Directors and Executives Meeting, Jan. 23. Kathryn MacCrae, 13210 Shaker Square, Cleveland 20, Ohio.

National Tool and Die Manufacturers Association. Hotel Schroeder, Milwaukee, Wis. Jan. 5-6. K. Jamiscewski, President, Superior Steel Products Corp., Milwaukee, Wis.

Society of Automotive Engineers. Annual Meeting. Book-Cadillac Hotel, Detroit, Mich. Jan. 8-12. John A. C. Warner, Secretary & General Manager, 20 W. 39 St., New York, N. Y.

Shop Equipment News

Michigan Shear-Speed Gear Cutter Machines a Hundred Parts an Hour



The Michigan Shear-Speed

The Shear-Speed gear cutting machine, developed and manufactured by Michigan Tool Company, Detroit, Mich., is capable of rough and semi-finish cutting as many as 60 to 100 or more gears per hour. The Shear-Speed brings the speed of gear cutting up to the level set by modern gear-finishing machines. One Shear-Speed and one shaving machine can, working as a team, be counted on to produce continuously a definite quantity of gears per hour.

In addition to its higher output rate, the Shear-Speed uses balanced cutting pressure around the gear. Only a simple grinding operation is required to bring dull blades back to correct form.

No particular skill is required for the operation of the machine. Gears are merely placed on the work holder. Chucking is part of the automatic machine cycle. The operator merely presses a button to start the machine. When the machine has completed its cycle it returns to loading position automatically and releases the finished gear for removal and loading of another blank.

The amount that blades are fed into the work on each stroke is adjustable. Correct sizing of the work is also automatically controlled and adjustable. A "jog" control is provided on the machine to inch it for set-up adjustments. Adjustments are also provided for speed of vertical reciprocation and length of stroke. To sharpen blades, or to change over to another type of gear to be cut, the entire inner cutter-head assembly is removed, as a unit, permitting insertion of another cutter head and resumption of production by the machine.

First of the new Shear-Speed sizes to be made available is the No. 1843, capable of handling gears up to 4 in. dia. and 2 in. face width. Shoulder, helical and spur gears can be handled on the machine.

Special provision has been made for rapid clearance from the work in view of the high rate of metal removal. Cutting fluid supply is located in the base of the machine and used under relatively high pressure to wash out the chips from the work.

Du Mont Ferrograph Compares Analysis of Ferrous Metals

Simple comparisons of ferrous materials as to analysis and heat-treatment are provided by the Ferrograph, a metal-testing instrument announced by Allen B. Du Mont

Du Mont Ferrograph

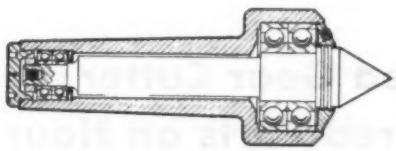
Laboratories, Inc., Passaic, N. J. Sorting of commonly used SAE steels is quite practical although in some cases the difference obtained is very small and may not be sufficient for sorting production lots of parts, but it can sort 80% of the mixtures of iron or steel that can occur.

Calibrated scale provides ten divisions per in., with the 10th division accentuated. The instrument operates on 115 v, 40-60 cycles. Dimensions are 12½ in. w., 17¼ in. h. and 23-¾ in. d. Weight is 100 lb. The instrument, fully portable, is designed to withstand rough usage.

Ideal Live Center Takes Loads Near Six Tons

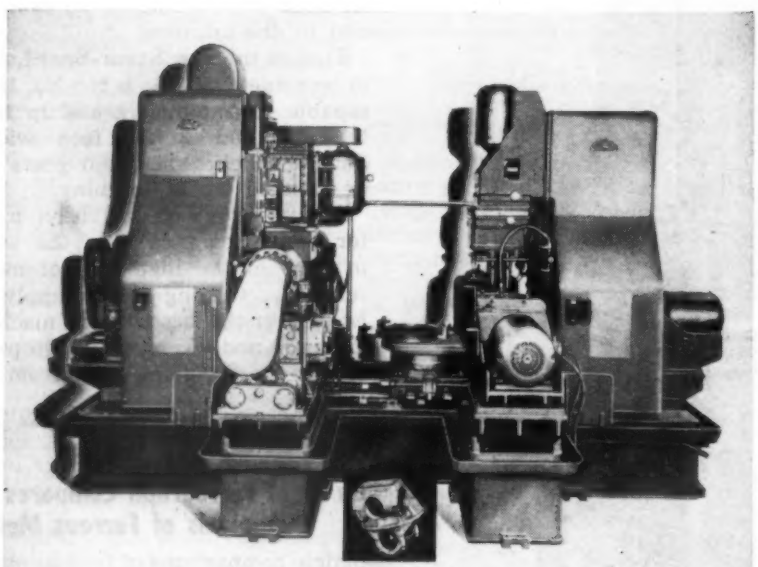
A "Live" lathe center, No. 6MH, for handling heavy loads up to almost six tons is announced by the Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill. The center has a guaranteed tolerance of 0.0000 to 0.0005. To handle radial loads to 5.750 lb. and thrust loads to 8,500 lb., a special bearing arrangement is used. Two precision ball bearings in tandem support the spindle at the front; and two angular contact ball bearings preloaded, support it at the rear of the housing.

Two sealing rings protect the bearings against the entrance of foreign matter.



Ideal "Live" lathe center

Snyder Special Purpose Machine Combines Drilling and Tapping



Snyder eight-way drilling and tapping machine

A special-purpose machine designed and built by Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich., combines multiple drilling and multiple tapping in a production operation.

The machine is built in two sections, one side for drilling, the other for tapping. In the center position, between the two work stations, the part is loaded and clamped in a locating fixture mounted on an index table for 180 deg. index. This rotary table is installed on a ball bearing-mounted fixture carriage and moves on two hardened and ground round rails.

The multiple heads and bushing plates that drill the various flanges in the part are mounted on Snyder self-contained, hydraulic guide bar units and all four heads are interchangeable with other heads having various numbers of spindles, set in various positions.

When the part is drilled it is returned to center position, indexed 180 deg. and rolled into the other section of the machine where all drilled holes are tapped.

Tapping units are equipped with fixed center tapping heads which are interchangeable for a variety of parts. All tapping spindles are equipped with ball bearing safety spindle ends to protect the workpiece and tools, providing automatic retraction of any individual tool which encounters an obstacle. Each spindle has individual lead screw feed.

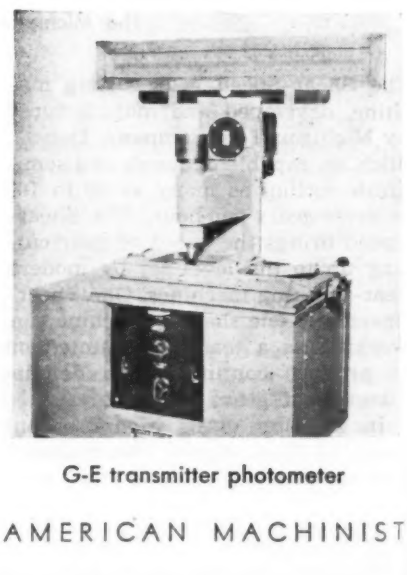
P. & E. Slide Rule and Decimal Point Locator Simplifies Problems

A slide rule and decimal point locator, available from Pickett & Eckel, 53 West Jackson Blvd., Chicago 4, Ill., is said to enable persons with a limited mathematical background to solve and place the decimal point up to 19 places in problems such as those containing cube root, square root logarithmic and trigonometric factors.

G-E Photometer Accurately Measures Transmitted Light

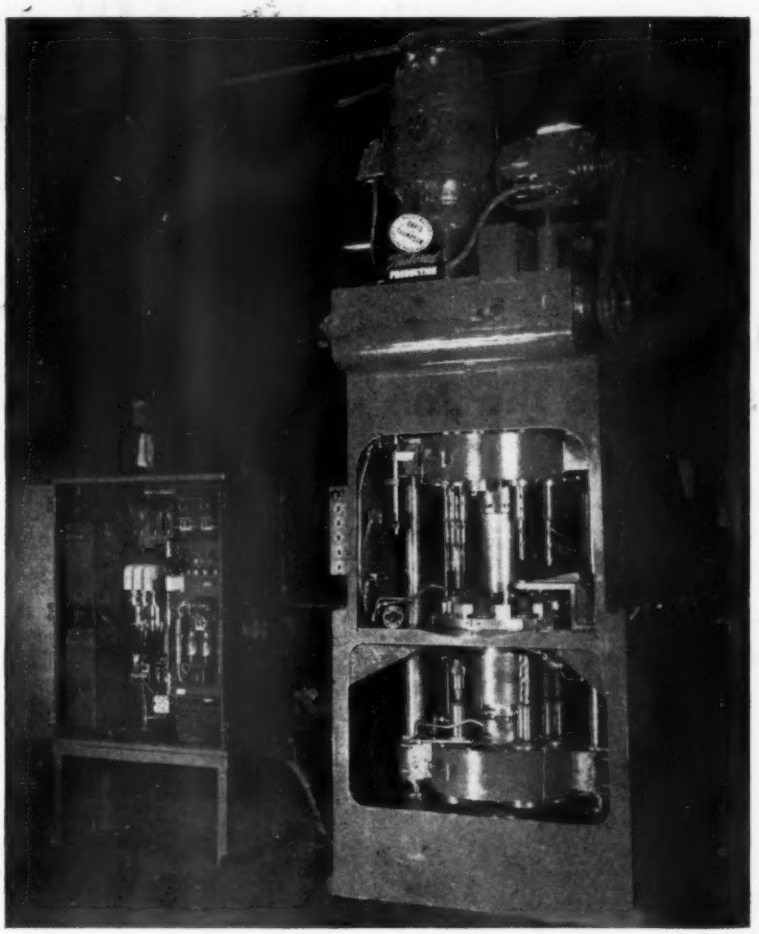
A new transmission photometer for measuring accurately the amount of light transmitted through very small areas of spectrographic plates, has been announced by the Special Products Division of the General Electric Co. The new photometer is desirable for use wherever spectrographic analysis is employed, such as in the metal fields, and also for microcolorimetric and microchemical analyses and for measuring light transmission through solutions.

Requiring a constant power supply of 6 v., a.c. or d.c., with an approximate capacity of 30 amp., the photometer consists essentially of a light source, an optical system, a galvanometer and a light-sensitive cell and a mechanical stage for accommodating the plate.



G-E transmitter photometer

D. & T. Vertical Indexing Machine Makes Universal Joint Body



D & T vertical 8 station indexing machine

The D. & T. vertical 8 station indexing machine was designed and created by Davis and Thompson, 6411 W. Burnham St., Milwaukee 14, Wis., to perform a series of operations on a universal joint body without removing the workpiece from the machine.

Power for the spindles is supplied by a 25 hp. motor. Feed and rapid traverse are accomplished by a 1½ hp. Thy-Motrol motor in conjunction with a two speed electrically operated gear box built into the top of the machine. Spindle heads are driven through a spline shaft and fed by two screws equipped with adjustable nuts. Feed can be varied from ½ in. to 7 in. per min. and rapid traverse is 100 in. per min.

The machine is hand locked and manually indexed. The cycle of operation is begun by pressing the starting button. The machine will not feed unless the drive motor is operating. Feed can be stopped and reversed by pressing the emergency return button. Production at a 2 in. per min. feed is 60 pieces per hr.

A forced lubricating system is employed throughout the machine, and a coolant pump provided. Through the use of spring loaded sheaves, one head acts as a counterweight for the other.

Norton Bura-Way Grinder Generates Uniform Edge

The Norton Bura-way grinder, now manufactured by Norton Company, Worcester 6, Mass., is said to provide the entire cutting edge of a tool with a uniform, adequate support including sections involving curves and radii. It is described as lengthening tool life, increasing production and reducing inventory of production tools.

Relief angles are ground as follows: plunge-cut tools, to 12 deg.; turning tools, to 10 deg. Back rake, to 14 deg., side rake to 10 deg.

It will handle convex single point cutting tools up to 1¾ in. wide by 1½ in. high; tools of larger section require special tool holder. The grinding wheel is a special 7 in. plate-mounted cup wheel with 2 in. face, mounted on a precision ball bearing, cartridge type spindle. Electric equipment includes a ¾ hp. 3,450 r.p.m. motor with manual starter and push-button control and a coolant pump driven by a ¼ hp. 1,725 r.p.m. integral drive motor with controls.

Norton Bura-way grinder

Pressed Steel Covers Cut Acme Transformer Weight a Fifth

By the use of pressed steel end covers, instead of steel castings, the weight of air cooled transformers produced by Acme Electric and Manufacturing Co., Cuba, N. Y., has been reduced an average of 22 percent. In addition, over-all dimensions in some sizes have been reduced as much as 4½ in. However,

Acme air coled transformer

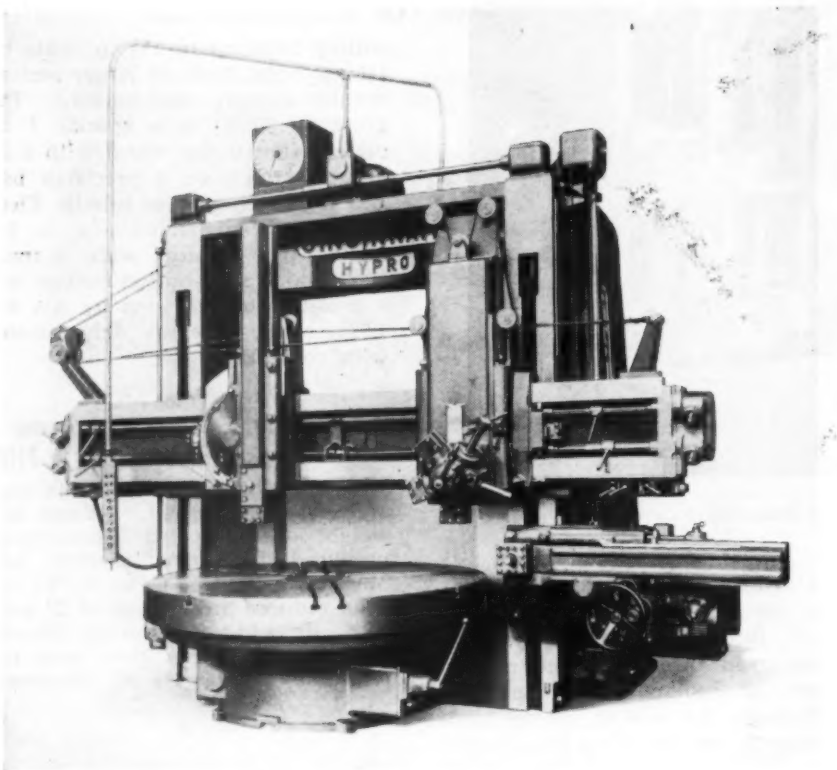
rated output is in no way effected and the temperature rise remains at 55 C. continuous. The new pressed steel design covers all Acme air cooled transformers, auto and insulated types from 1 kva. to 15 kva. with primaries up to 2,400 volt.

Leonard Top-Grip Cable Terminal Ups Battery Life

A new battery terminal for automotive use, announced by Leonard Manufacturing Co., 3451 Glendale Blvd., Los Angeles 26, Calif., is said to increase battery life and efficiency by positive connection. Its grip is at the rate of approximately 10,000 psi on the battery post. It will not loosen the battery post when installing or removing, because all exerted pressure is on the top of the post. Oxidation is eliminated due to air-tight connection. The terminal is ruggedly constructed of cast brass and heavily tinned to prevent corrosion.

Before installation, the lead terminal post of the battery must be grooved with a special set of jaws available for use with 10 in. vise grip pliers.

Cincinnati Hypro Table Drive Gives Speeds Suited to the Job

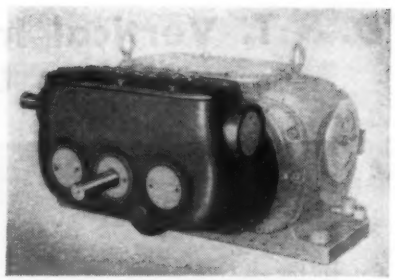


Cincinnati Hypro Table Drive

The Cincinnati Hypro Table Drive, developed by the Cincinnati Planer Co., 3120 Forrer St., Cincinnati, Ohio, has finger-tip speed adjustment by a multi-point, fine increment motor rheostat in place of conventional gear shift changing. The complete range of table speeds under cutting loads ordinarily encountered may be handled by push button control from the operator's normal working position. He can do this without changing gears or stopping the work table.

Heavy cutting requirements at low speeds are met by a suitable back gear operated by a single lever. Set-up time is reduced by fine inching control in both directions of table operation.

Complete control of all motors from a single, accessible pendant station, plus absence of table clutch and brake shifting, lessens the operator's fatigue. The operator need not bend over coolant or chip guards to shift gears. Visibility of the large speed dial mounted a-top the boring mill eliminates extra movement about of the operator and gives him instant indication of table speeds.



Ohio Gear variable speed drive

Ohio Differential Variable Speed Drive Maintains Constant Torque

The Ohio Gear Co., 1326 E. 179 St., Cleveland, Ohio, announces a different variable speed drive which, using an 1,800 r.p.m. squirrel-cage motor as a source of power, delivers output speed from 0 to 800 r.p.m. in one direction, or from 400 r.p.m. forward, through 0 to 400 r.p.m. reverse. Torque remains constant throughout the whole range.

Units may be supplied to provide up to 2,100 in. lb. torque through the same speed ranges. By means of a control box furnished with the unit the output shaft can be made to duplicate any movement of the control shaft. The control shaft may be operated with but a few in. lb. torque, while the output shaft will deliver the full power of the unit.

The differential bevel gears are of alloy steel, case hardened and mounted through on anti-friction bearings.

Clearlube Coolant Compounds Will Not Break Down or Spoil

Two new coolant compounds have recently been introduced by Clearlube Products Co., 1912 Book Tower, Detroit 26, Mich. Of these, Clearlube Aqua-Cut is water soluble, while Clearlube Petro-Cut is soluble in oil.

No free sulphur or fatty acids are used in the basic compounds, and hence these products do not break down, become rancid or undergo any chemical change regardless of pressure, speed, heat or length of use. They provide the essential ability to adhere to all surfaces and particularly in the area and at the actual point of contact of the cutting tool with the work. In addition, both compounds provide a rust proofing film which eliminates any need for other means of rust proofing parts between machining operations. These compounds contain no ingredients which cause dermatitis or which might harm the skin or body tissues.

Zenith Program Timer Gives Flexible Control

The Zenith Program Timer, manufactured by Zenith Electric Co., 152 W. Walton St., Chicago 10, Ill., is synchronous motored for the giving of signals at any 5-minute period in a 24-hour schedule, with circuit closures from 5 to 60 seconds. As many as 288 operations a day are possible.

The program mechanism is set automatically by turning the minute hand as on an ordinary clock. The

Zenith program times

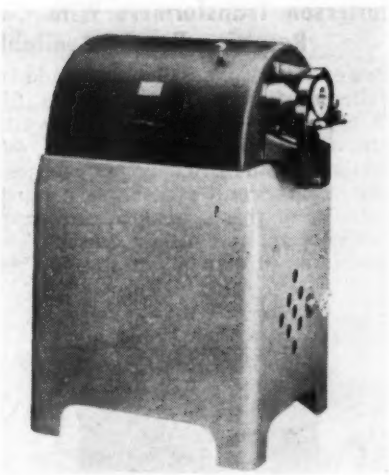
schedule is easily changed at any time, without the use of tools, by inserting small brass clips in the slots of the program disc. Operation is performed by a set of cam-operated contacts. Silver contacts operate with sharp action.

The mechanism rating is 10 amps., 110 v. Steel case is 8 × 12 × 4 in.

Michigan Microtape Insulates Plating Racks and Masks Parts

Microtape, a new tape for the insulation of plating racks and for masking parts prior to selective plating, has been announced by Michigan Chrome and Chemical Co., 6340 East Jefferson Ave., Detroit, Mich. Made by an extruding process, the tape has a slightly curved surface which feathers out to uniformly light edges, making it easy to apply, smoothly overlapping and snug fitting.

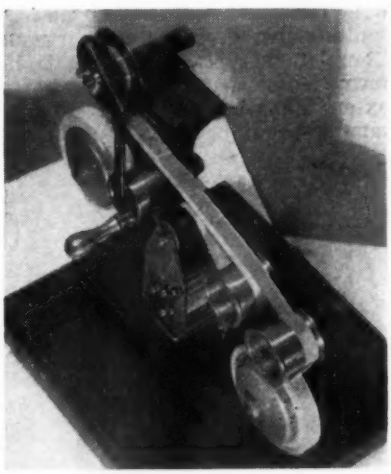
When Microtape is used for the protection of plating racks, there are no pockets of any kind and no possibility of solutions being trapped during plating or cleaning cycles. It can be built up to any desired thickness and, by heating for an hour at approximately 300 F., will fuse into an integral coating. It offers effective resistance to all plating solutions.



Leonard 3CP Tube Master

Automatic Tube Master For Ferrous and Non-Ferrous Tubes

Leonard Precision Products Co., Garden Grove, Calif., announces a new, completely automatic Model 3CP Tube Master for squaring, burring, flaring and beading ferrous and non-ferrous tubing of sizes from ⅛ to 3 in. o.d. It will handle both ferrous and non-ferrous tubing in all four operations, carrying it automatically through the entire cycle.



Topflight laminating tape printer

Topflight Laminating Tape Printer Speeds Labeling

A laminating cellulose tape printer announced by Topflight Tool Co., P. O. Box 6728, Towson 4, Md., includes a dispenser as well as a rewinding unit; this makes it possible for the operator either to print a supply to have on hand or to print and immediately dispense the amount necessary for a particular job.

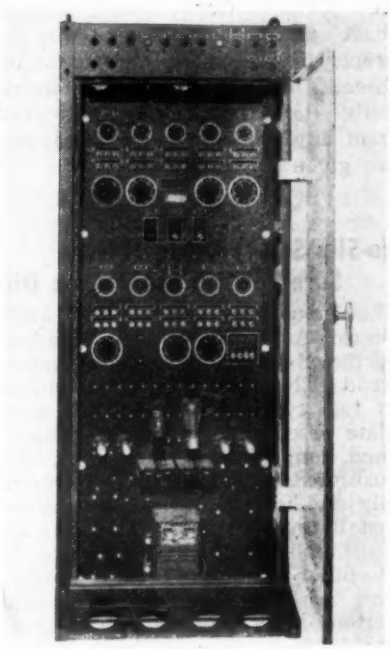
Cellulose tape that has been printed and then laminated to another strip of tape has proven of increased resistance to wear, oil, gasoline and salt water. The laminating process seals the printing ink between the two tapes. While such tape is available, printed to order, many plants have set up their own printing department to expedite frequent changes.

The printer is simple to operate and any stock room clerk can learn to handle it efficiently in a few hours. Use of rubber numerical printing rings reduces the cost as compared to what it would be if brass printing wheels were used.

G-E Weld and Sequence Timer for Heavy Sections

A new weld and sequence timer, Type CR7503-F170, for providing the various time and current adjustments necessary for welding heavy sections of air-hardenable steels, has been announced by the Industrial Control Division, General Electric Co., Schenectady, N. Y. It is especially designed for use with a G-E ignitron contactor and a heat control panel, but can also be used in combination with most G-E spot-welding controls which include the phase-shift method of heat control.

Operating from 230/460/575 v., 60 cycles, the control adjusts the time of current flow and its magnitude for preheating, welding, grain refinement and tempering. Other adjustments control the time for chilling the weld nugget following the refinement periods.



G-E weld and sequence timer

Cargille master magnifier set

Cargille Master Magnifier Set Speeds and Eases Inspection

A new assembly of wide field magnifiers with built-in illuminating units, operated by battery and by electric control, and containing 7,-20- and 40-power magnifiers, has been announced by R. P. Cargille, 118 Liberty St., New York 6, N. Y. The set comes in a compact, portable carrying case.

The 40-power is equipped with a 0.001 in. scale and can be used independently of outside illumination.

New Britain torque wrench

New Britain Torque Wrench Readings Go to 105 Ft. Lb.

The torque wrench manufactured by The New Britain Machine Co., New Britain, Conn. comes with a chart giving recommendations for proper torque on dry threads or oil threads, main bearings and manifolds. Its two dials are easily read from any working angle. Readings are given up to 105 ft. lb.

No-Slip Safety Treads Offer Sure Footing Even When Oily

The Industrial Products Co., 18123 Detroit Ave., Lakewood 7, Ohio, has perfected No-Slip, a new safety tread. The product is manufactured in two types: No. NS100, a steel plate base, studded with case-hardened, long wearing studs, provides positive footing even when wet or oily and is designed for permanent installation; No. NS200 is a portable style embodying all the features of the other type, and having, in addition, case-hardened studs on the bottom. This latter type is designed especially for use in front of machines.

Jefferson Transformers With Resetting Breaks Available

Power circuit transformers made by Jefferson Electric Co., Bellwood, Ill., in capacities from 100 to 750 watts, are now available with simple, effective circuit breaker for overload and short-circuit protection. Transformers of these capacities are used extensively, mounted directly on machines to step down the 550, 440

Jefferson transformer

or 220 v. to 100 v. for various electrical appliances and localized lights.

Transformers can be furnished with "on" and "off" switch and receptacle in the wiring compartment. Completely housed in the transformer case with the reset button extending, the circuit breaker is tamper-proof.

National checker

National Device Checks Gears' Eccentricity and Parallelism

A new device for checking spur gears for eccentricity and tooth parallelism is announced by National Broach and Machine Co., Detroit, Mich. It can be furnished for 12, 18 and 24 in. max. pitch dia. The device consists of a rigid base with a top finished to the tolerance of a toolmaker's flat and having two V keyways crossing at 90 deg., one for the adjustable work holding centers and the other for the checking heads, one checking head on either side of the work gear.

Holophane Superficiency Lobay Unit for 20 Ft. High Mounting

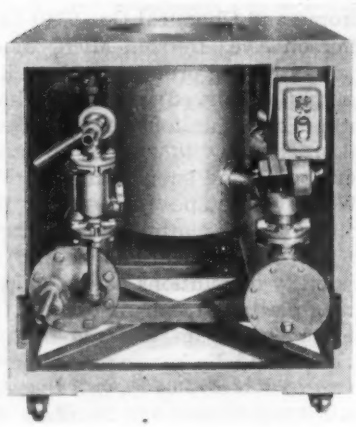
Holophane Co., Inc., 342 Madison Ave., New York, N. Y., announces Lobay superficiency "one-point-five" reflectors with intensive distribution for general use where the mounting height does not exceed 20 ft. They are designed to provide adequate, even lighting on spacings as great as 1.5 times the mounting height above the work. A shielding angle of 25 deg. effectively eliminates glare. Three sizes are available to accommodate from 25 to 300-watt lamp.

B & G Junior Quencher Makes Cooling Automatic and Sure

For controlled quenching where small pieces are heat treated, the B & G junior quencher, produced by Bell & Gossett Co., Morton Grove, Ill., is said to assure uniform results, while saving time and quenching fluid. It is a completely self-contained unit, combining quench tank with cooler, strainer and all control equipment.

A turbulent velocity of the oil is set up in the quencher to carry the heat from the surface of the piece sufficiently fast to prevent formation of gas bubbles. According to the manufacturer's description, it eliminates human error and reduces the cooling process to a purely automatic operation. Temperature of quenching liquid is accurately controlled. A strainer removes dirt and scale.

Cooling metal from 1600 to 150 F., its capacity is 40 to 60 lb. per hr., continuous quench, or four 10-lb. batches per hr.



B & G junior quencher

LODGE & SHIPLEY LATHES *at work*

MACHINING ROCK BITS AND DRILL COLLARS FOR **REED ROLLER BIT CO.** OIL FIELD EQUIPMENT

● Digging deep into the earth, Reed rock bits and drill collars probe for oil urgently needed for war and increased production.

Machining these huge drill collars and small bit parts, requires an unusually wide range of turning jobs. To deliver this highly diversified output, Reed depends on Lodge & Shipley Lathes.

Above, a massive Lodge & Shipley Hollow Spindle Lathe is shown hogging a 30 ft. drill collar. A battery of Duomatics—full automatic lathes—produce small bit bridges. (Note end of shaft below).

The Hollow Spindle Lathe has all the advantages of Lodge & Shipley's famed Engine Lathes . . . plus a large hole through spindle for oil country, maintenance, bar, cutting-off and other jobs normally requiring a long bed.

The Duomatic is far and away in a class by itself among automatic lathes. It permits greater use of multiple tools in turning and straight and angular facing operations—in large or small lots.

Write for detailed bulletins No. 601 (Duomatic Lathes) and Nos. 616 and 621 (Hollow Spindle Lathes). And for a practical demonstration, call on L & S Engineers. They'll gladly serve you.

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI 25, OHIO, U. S. A.

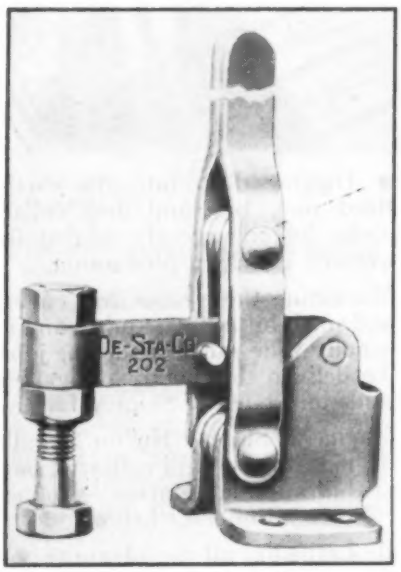
L & S LATHES

ENGINE — TOOL ROOM — AUTOMATIC — OIL COUNTRY LATHES

Westinghouse Electronic Timer Gives Uniform X-ray Exposures

The electronic timer developed by the Westinghouse Electric and Manufacturing Co., is said to time each exposure properly, quickly and automatically. The timer in effect, measures the light leaving the fluorescent screen on which the X-ray cast the object image. When sufficient light has left the screen for satisfactory film exposure, the proto-electric tube which scans the screen actuates a relay, opening the X-ray circuit and terminating the exposure.

Whether similar objects, such as castings, are moving rapidly on a conveyor or whether a variety of irregular objects must be X-rayed, the electronic timer will provide uniform exposure quickly and efficiently.

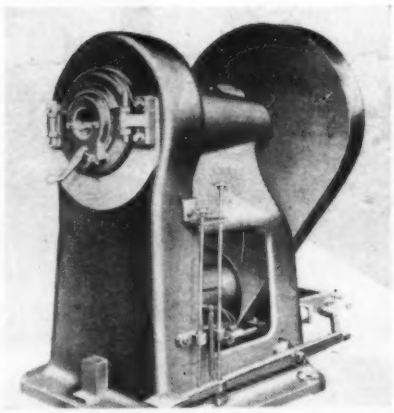


De-Sta-Co Model 202-A toggle clamp

Detroit Stamping Announces All Aluminum Toggle Clamp

A new light-duty, all-aluminum toggle action clamp, De-Sta-Co Model 202-A, is announced by the Detroit Stamping Co., 343 Midland Ave., Detroit 3, Mich. This clamp is designed for use on portable or spot welding fixtures but is expected to prove interesting wherever space limitations or weight of clamp is a factor.

Made of pressed aluminum parts, the clamp weighs less than 3 oz., including steel hold-down spindle and adjustment nuts. The clamp measures 2½ in. long, 1⅝ in. wide at base and 3¾ in. high when in locked position.



Standard automatic cable swager

Standard Automatic Cable Swager Boost Production

A new cable swager produced by Standard Machinery Co., Providence, R. I., is a fast automatic die opening and automatic feeding unit requiring only three seconds for each complete operation. The clearance when the dies are opened is sufficient to accommodate all standard types of fitting attachments. Once the cable and fitting have been passed through the opening into the adjustable feed socket and the operation started, the work is moved automatically through the dies to completion. Four Standard cable swaging machines handle cable sizes from 1/16 to 1½ in.

Willson Face Protection Shield Designed for Comfort and Safety

An improved type of face protection shield, designed for maximum comfort, has been announced by Willson Products, Inc., Reading, Pa., for light duty operations. It is made to fit over correction spectacles and extend well back along the sides of the face to provide complete protection for face and forehead.

The shield has an adjustable headband, front cushioning with replaceable leather sweat band, back cushioning with pliable plastic tube, tough, light-weight forehead-protecting guard and combination friction swivel and guard which permits raising of the shield but prevents blows from pressing it against the face.

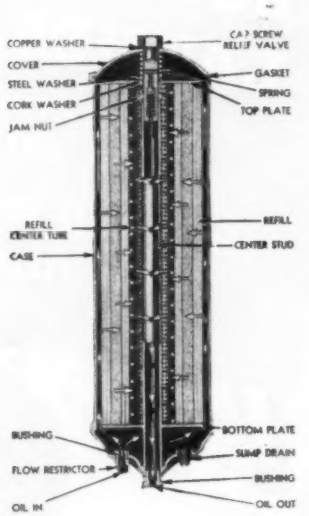
This shield may be obtained with either clear or green visor in 4, 6 or 8 in. visor lengths.

Willson face protection shield

Briggs Announces Clarifiers And Filters for Various Uses

Briggs Clarifier Co., 1339 Wisconsin Ave., N.W., Washington, D. C., announces five new lines of clarifiers and filters.

Series DR lubricating oil clarifiers, designed for by-pass installation, are equipped with precision-built relief



Briggs series G clarifier

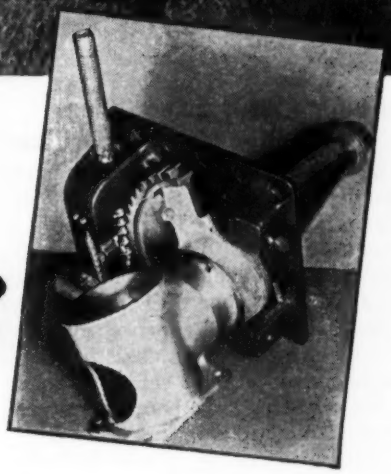
valves set to maintain the most efficient operating pressure inside the clarifier and to allow circulation through the clarifier when the oil is cold. Flow capacities range from 1 to 20 g.p.m. Various size models are designed for working pressures of from 40 to 60 psi. and hydrastatic test pressure of 60 to 150 psi.

Units of the DRU series of self-contained automatic recirculating clarifiers have rotary positive displacement pumps and electric heaters installed in their bases. Overload cutouts protect the motor and heater. Dual pumps recirculate oil in the clarifier independently of oil entering and leaving the unit. Each is equipped with a metering pump based on the horsepower of the engine to which it is suited.

Briggs series G clarifiers are relatively small capacity units designed primarily for oil filtration service on mobile, marine and light duty stationary engines with a minimum flow capacity of 3 g.p.m. They are also suitable for many types of ma-

CONE-DRIVES

He landed—



on Tomorrow's Control Gears

Gears for tomorrow's controls will be more accurate, longer lived, able to carry heavier loads in smaller sizes, be more efficient. Gears which will do that sort of job will not have to be "invented". They are already in use in our warplanes—to retract and lower the landing wheels, to control aileron movement, and many other similar uses.

A pinion and sector type Cone-Drive gearing used for such purposes weighs about • 1/3 as much, takes up only 2/3 the room of comparable gearing of equal load capacity. That's because Cone-Drive is the only form of gearing in which both members envelop each other in true mating contact—which means both large surface contact between mating teeth and more teeth in contact at any instant. With the load distributed in this manner there is vastly less wear in Cone-Drive gearing, reflected in long maintained accuracy.

For more information on this highly successful type of gearing ask for manuals:
CW-41B (for Executives) · CW-41A (for Design Engineers)

FOR VICTORY
BUY UNITED STATES WAR BONDS AND STAMPS

CONE-DRIVE DIVISION MICHIGAN TOOL COMPANY
7171 E. McNichols Rd., Detroit 12, U.S.A.

chine tool lubricating and hydraulic oil system.

Briggs Series F fuel oil clarifiers are designed for diesel and gasoline engines consuming from 5 to 10 g.p.h.

The ZR series is designed for the continuous filtration of soluble oils, low viscosity cutting oils and kerosene. These filters can be installed on either unit machines or in central systems.

The DFR series of round tank fuel oil filters for diesel engines have flow capacity ranges up to 500 g.p.h. On the larger models of this series provision is made for registering pressure differential across the refill cartridges, giving the operator an accurate indication of when to change refills.

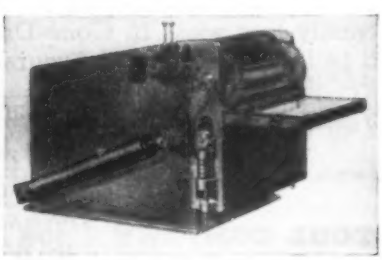
Nopco Rust Inhibitor and Vegilube Mold Dressing Ready

Three products, Nopco 1692, Nopco 1692-B and Vegilube, have been introduced by National Oil Products Co., Harrison, N. J. for the metalworking industry. The first two are solvent type rust and corrosion inhibitors, while Vegilube is a glyceryl ester used in the preparation of mold dressings.

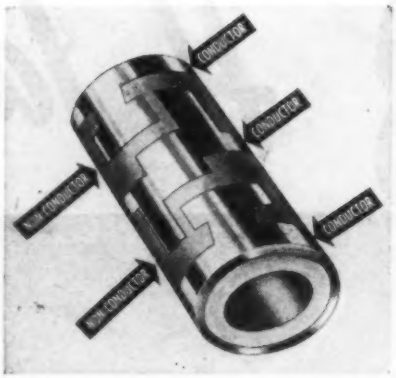
Struthers Wells Single Wing Tangent Bender for Short Runs

The new Single Wing Tangent Bender, built by Struthers Wells Corp., Titusville, Pa., is said to smoothly edge bend sheet metal, handling all except the heavier duty jobs. With proper dies it will bend sheets either with sharp corners, or to any desired radius. This new unit is designed to take care of shorter runs and tangent bends requiring more frequent die changes.

The machine is of welded construction, hydraulically operated. It is available in three sizes: No. 3 for bending sheets 36 in. max. width by any length; No. 7, for bending sheets 84 in. max. width by any length; and No. 10, for bending sheets 120 in. max. width by any length.



Single Wing tangent bender



Metaplast commutator

Metaplast Company Announces Plated Plastic Commutators

Manufacture of intricately designed commutators using metal plating on plastics has been announced by the Metaplast Co., 205 West 19 St., New York, N. Y. It is possible to mold precisely various odd-shaped thermo-setting or thermo-plastic commutators by molding in or machining grooves and depressions wherever contact surfaces are desired. These grooves and depressed areas are then built up flush with the non-conductive surface by metal plating. The commutating surface is then ground smooth, affording a one-piece unit of conductor and nonconductor in any shape or type.

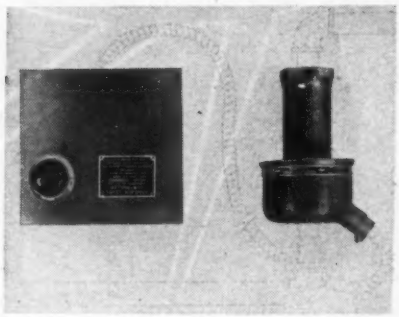
General MF foot switch

General Low Fying Foot Switch Is But Half-Inch Above Floor

General Control Co., 1200 Soldiers Field Rd., Boston 34, Mass., announces Model MF, a new foot switch for actuating one to eight circuits, describing it as the flatest foot switch ever manufactured. The foot rest is only ½ in. above the floor and the switch requires only 1/16 in. throw. This allows the operator to support his whole foot nearly at floor level, thereby reducing fatigue. It is splash and dust proof.

Hancock Electric Level Float Control Trouble-Free

The Hancock Valve Division, Manning, Maxwell & Moore, Bridgeport, Conn., announces the Hancock electric level float control, designed to keep liquid level to within a fraction of an inch. By the simple adjusting of a screw, the level of the liquid can be raised or lowered.



Hancock electric level float control

The control is said to be mechanically trouble-free, since it is mechanically simple. It does not have electrical switching or contacts, nor are there levers, linkages, bellows, stuffing boxes, cooling fins, mercury switches or wearing parts.

Phillips three-stage metal washing tank

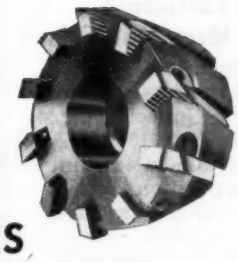
Phillips Three-Stage Metal Washing Tank is Announced

The Phillips Manufacturing Co., 3408 West Touhy Ave., Chicago 45, Ill., presents a three-stage metal washing tank designed for use with an emulsifying cleaner or as an alkali washer; it comprises a heated solvent tank with two heated water rinse tanks.

The heated solvent tank has a thermostatically controlled range from 135 to 250 F. and a drain board which conducts the "drag out" solvent back into its tank. After immersion in the cleaning agent and draining, the parts are immersed in the first, then the second rinse tanks, emerging, finally, completely oil and dirt free. The water rinse is also heated, with a controlled flow that keeps the temperature at about 180

McCROSKY

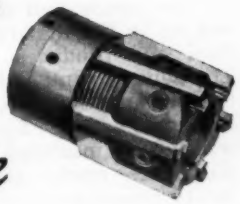
Jack-Lock
MILLING CUTTERS



Face, Half-Side, and Staggered Tooth Milling Cutters featuring McCrosky's exclusive, nationally recognized Jack-Lock wedge that holds the blades rigidly and solidly yet permits easy, quick release for adjustment, regrinding or replacement. Send for Bulletin 16-M.

McCROSKY

Super Adjustable
REAMERS . . . . . .



Chucking or shell types. Straight or spiral mounted blades are held rigidly with McCrosky's time-tested shop-proved pin and screw locking device, assuring easy and uniform adjustment,—and regrinding with minimum loss of blade stock. Send for Bulletin 16-A.

Cut your costs with McCROSKY TOOLS

McCROSKY

Block Type
BORING BARS . . .

Featuring McCrosky's exclusive, patented centralizing V-lock that centers and holds the cutter blocks accurately and rigidly, yet permits the operator to change the block easily, and to "float" with extreme accuracy the block used in making finish cuts. Send for Bulletin 16-B.

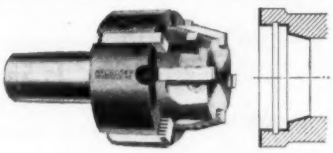
McCROSKY

Wizard
CHUCKS AND COLLETS

. . . permit the collets to be latched and centered rigidly in the chuck and released easily, without slowing down the spindle, thus making multiple tool jobs continuous, and permitting machine tapping, at high speed, on drill press or lathe without danger of tap breakage. Send for Bull. 16-D.

McCROSKY

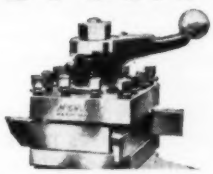
Special
MULTIPLE DUTY TOOLS



. . . combine related facing, boring, counterboring and reaming operations, permitting 3, 4, 5 or more operations to be done simultaneously with just one tool, speeding up production, and cutting costs. Each tool engineered to the individual job. Suited for long or short runs. Send for Bulletin 17-S.

McCROSKY

Turret
TOOL POSTS . .



Mounted on the T-slot of the compound rest, or bolted on the main slide, McCrosky turrets enable the operator to handle successive operations without stopping for tool changes,—give engine lathes the versatility of turret lathes. Square and hexagon designs. Send for Bulletin 16-E.

McCROSKY TOOL CORPORATION
MEADVILLE, PA.

COST CUTTING TOOLS

Designers and Manufacturers of

Jack-Lock MILLING CUTTERS — *Block Type* BORING BARS

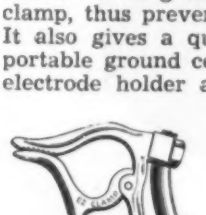
Wizard CHUCKS AND COLLETS

Super Adjustable REAMERS — *Turret* TOOL POSTS

F., and an arrangement providing for the removal of most of the dirt and oil in the first rinse so that the final one produces oil-free work. The solvent tank is heated by strip heaters and the water rinse by immersion heaters. The heated tank's walls are insulated and working parts are easily accessible. Two safety covers hang at the side of the tank when not in use and protect the operator from contact with the tank itself.

E-Z Ground Clamp Designed To Prevent Overheating

The E-Z ground clamp announced by Will-Weld Manufacturing Co., 600-620 South 15 St., Omaha 2, Neb., is so designed that the current does not travel a great distance in the clamp, thus preventing overheating. It also gives a quick, positive and portable ground connection, making electrode holder and cable operate cooler, last longer and use less current. The clamp is of solid copper alloy construction. Its sharp teeth are said to bite through rust, paint and scale to make a solid contact.

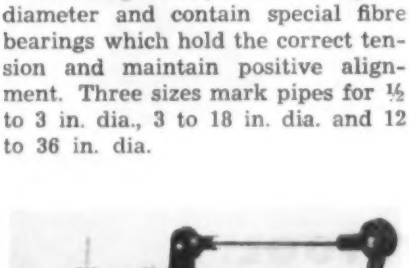


E-Z ground clamp

Trumark Protractor Marks Pipe, Shapes and Sheets for Cutting

Pipe, structural shapes and flat sheets are said to be quickly and accurately scribed for cutting on any angle to one-half of a degree, with Trumark Protractor, manufactured by the Tru-Line Corp., 759 Venice Blvd., Los Angeles 15, Calif.

The protractor is made of precision-machined cast bronze alloy and steel tubing. The joints are large in diameter and contain special fibre bearings which hold the correct tension and maintain positive alignment. Three sizes mark pipes for ½ to 3 in. dia., 3 to 18 in. dia. and 12 to 36 in. dia.



Trumark Protractor

Rolamarkers Make Continuous Imprints on Many Materials

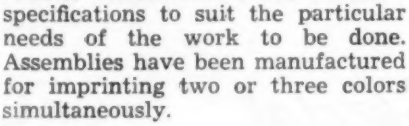
Rolamarkers, designed to imprint single or continuous impressions, are announced by Adolph Gottscho, Inc., 190 Duane St., New York 13, N. Y. With them it is possible to imprint asbestos, cloth, composition board, wood, paper and metal sheets, bars, rods, angles, tubes or pipe.

Units are available to mark continuous strips 2 to 10 in. wide. Those intended to make but a single imprint feature a return mechanism which automatically revolves the drum to starting position for the next impression; the self-returning

Continuous marking Rolamarker

Rolamarkers are available to imprint areas from 1⅝ × 4 in. to 9 × 15 in.

The drum of each is made to hold fixed dies, interchangeable type or a combination. Each is automatically inked by one or two self-inking rollers. Rolamarkers are made to specifications to suit the particular needs of the work to be done. Assemblies have been manufactured for imprinting two or three colors simultaneously.



Sturtevant sensory torque wrench

Sturtevant Sensory Torque Wrench Speeds Assembly Work

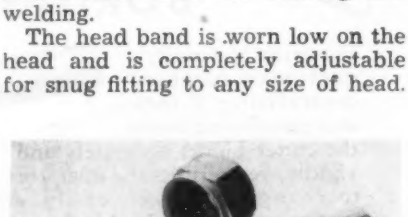
Sturtevant sensory torque wrenches, manufactured by The P. A. Sturtevant Co., Addison, Ill., appeal to the senses of sight, hearing and feeling to notify the operator when the desired pre-indicated torque has been reached. Notified by a loud click, a definite strong impulse to the hand and by visual reading, the operator automatically releases his pull on the wrench, making torque fast and accurate.

B & C Hundred series face shield

B & C Face Shields Feature Interchangeability of Parts

The new Hundred series of face shields, designed about the primary motive of comfort for the wearer, announced by the Boyer-Campbell Co., 6540 St. Antoine St., Detroit 2, Mich., has completely interchangeable parts. As in other B & C models, this series offers a choice of three different thicknesses and three different sizes of cellulose acetate general purpose windows, as well as three different sizes of 24-mesh screen windows for heat protection and a fiber front for scarfing and welding.

The head band is worn low on the head and is completely adjustable for snug fitting to any size of head.



Aeroquip nipple, nut and socket

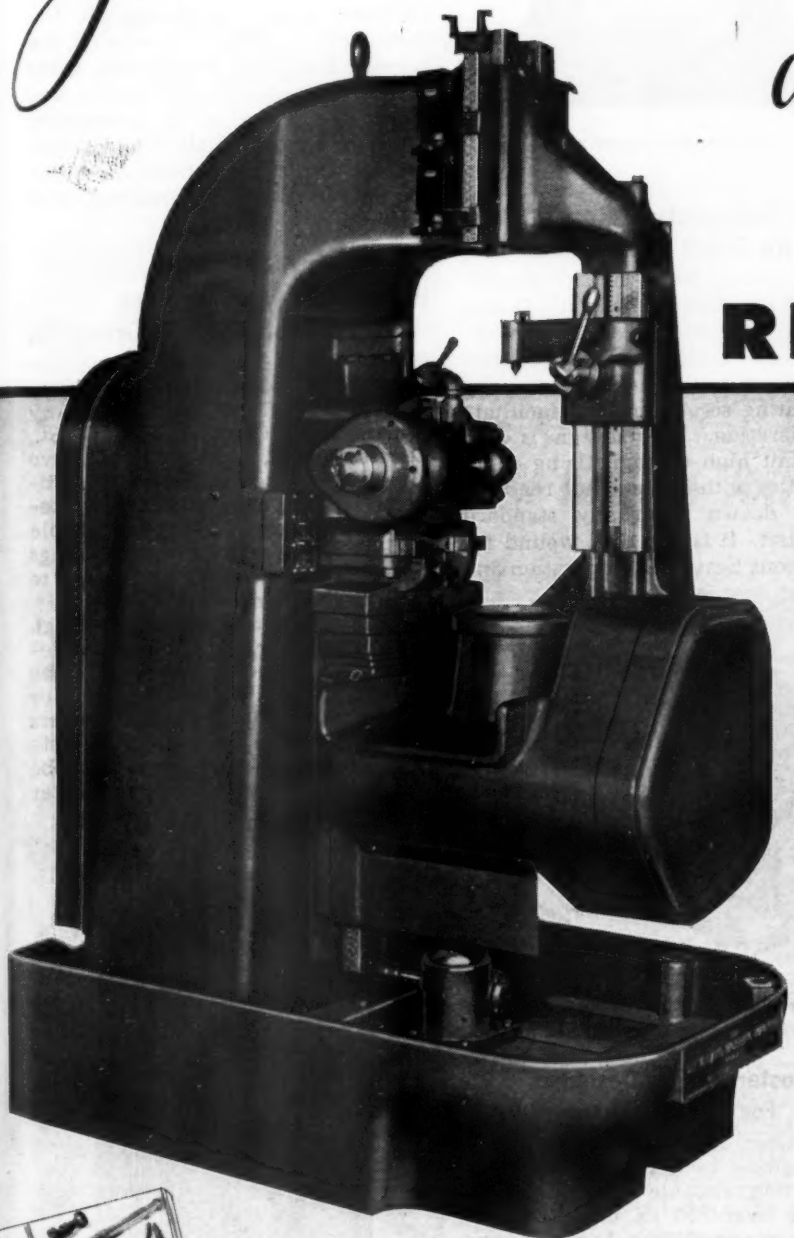
Aeroquip Self-Sealing Coupling Is Simple and May Be Re-Used

Detachable hose fittings, available from Aeroquip Corporation, Jackson, Mich., are so designed that assembly can be made on production basis as well as by hand. The ultimate user has, therefore, the benefit of having hose lines which can be repaired easily.

Assembly is accomplished by simply screwing nipple into socket. No part has to be deformed and overstresses are impossible. Fittings can be used repeatedly. In most cases the fitting is hardly larger than the hose. Couplings may be assembled with various types of hose with working pressures up to and sometimes exceeding 1500 psi.

For Precision Hobbed Gears and Splines

THE RIGIDHOBBER

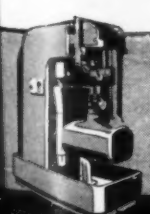


The Rigidhobber presents a high production method for the accurate duplication of spur and helical gears —straight and helical splines. The rigid support to the workhead both above and below the work eliminates spring in either work or hob and assures dependable precision of all work. The hob, on all but very small gears, is supported at the drive end of the hob arbor and by an outboard support.

This rigid support to both work head and hob during entire cutting operation assures the utmost in precision —both on small lots and quantity production.

Bring your hobbing problems to Cleveland Hobbing Engineers for specific information on your job or send sample or blueprint for estimate.

This bulletin explains the Rigidhobber in detail—gives specific information on construction and operation—tells capacities and sizes furnished.



The CLEVELAND HOBBING MACHINE Company

General Offices:
1311 CHARDON ROAD
CLEVELAND 17, OHIO

Chicago Office:
624 S. MICHIGAN AVE.
CHICAGO 5, ILLINOIS

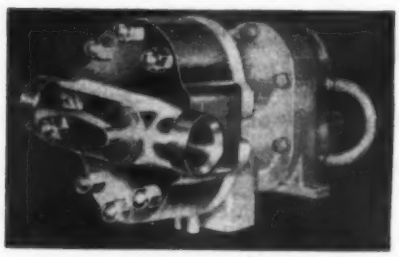
BUILDERS OF RIGIDHOBBERS AND RIGIDTURNERS

Oscap Diamond Impregnated Burs Metal Bonded and Supercharged

Oscap Manufacturing Co., 207 West Saratoga St., Baltimore 1, Md., announces metal bonded and supercharged diamond impregnated burs. According to the manufacturer, diamond dust, specifically graded from 80 to 500 grit, is impregnated in a special alloy metal bond which keeps its surface longer, resists shock, will not chip or groove and has the exclusive feature of a supercharge of diamonds below the regular 0.050 in. depth of impregnation.

Oscap diamond impregnated burs

These diamond burs are made with ⅛ and ¼ in. shanks with diamond impregnated heads for 1/16 to ½ in. dia. in 1/32 in. graduations.



Marco Flow-Master pump

Marco Flow-Master Pump Keeps Volumetric Efficiency

The Flow-Master transfer, metering and proportioning pump, manufactured by the Marco Company, 511 Monroe St., Wilmington,. Del., is designed to maintain a steady, nonpulsating delivery and to give positive displacement without churning or foaming. It is easily and quickly cleaned, facilitating change from one product to another. It is constructed of a stainless metal combination that will not seize or gall. Standard pumps are built in capacities for all standard ranges.

Dakon demagnetizer

Dakon Demagnetizer Requires No Direct Contact with Tool

Model MAG-NO industrial demagnetizer, developed by the Dakon Tool & Machine Co., 838 Broadway, New York 3, N. Y., requires no contact with the tool, thereby eliminating scratching and facilitating operation. This design is said to permit high demagnetizing characteristics with low current requirements, drawn from any standard a.c. outlet. It is portable, wound for continuous heavy duty operation and will not overheat.

Aeroil Waxmaster Major

Waxmaster Major Designed For Large Volume Melting

Waxmaster Major 70 gal. dipping and melting tank for large volume production, capable of melting and heating over 550 lb. of wax in 75 min., is announced by Aeroil Burner Co., 5701 Park Ave., West New York, N. J.

The unit is available as a fixed installation only, mounted on sturdy, reinforced skids. Its two heavy duty 6.5 kw. capacity heating elements are controlled by a built-in thermostat with sturdy contactor of special design and powered by 220 v., a.c. The thermostat regulates temperatures automatically from 100 to 550 F. and is equipped with a knob dial and pilot light. A built-in dial thermometer is supplied for swift checking of wax temperatures. Dipping space is 48 in. long, 20 in. wide and 15 in. deep.

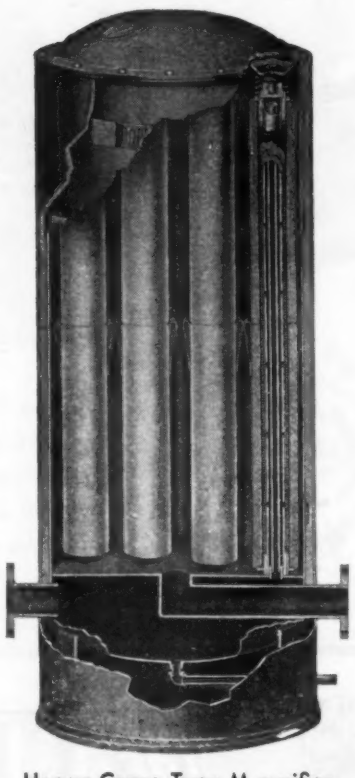
CarboRustex Removes Rust, Does Not Attack Unoxidized Metal

A rust solvent, CarboRustex, announced by Carbozite Corporation, First National Bank, Bldg., Pittsburgh 22, Pa., has an affinity for rust, but will not attack the unoxidized metal, according to the manufacturer. Non-inflammable, the solvent is applied with brush, spray or dip method, spreads readily and leaves no globules. A companion solution, a rust inhibitor which will protect the surface from oxidation for several days, is furnished with CarboRustex.

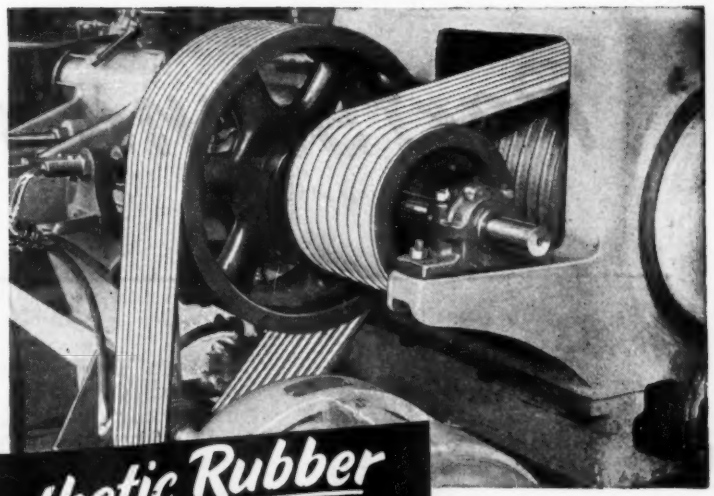
Honan-Crane Purifier Uses Cartridges in Groupings

Recent changes in engineering design of the Type M multiple cartridge oil purifier, manufactured by Honan-Crane Corp., 101 South St., Lebanon, Ind., are said to have greatly increased its operating efficiency. This type purifier is designed to use single or multiple cartridges in standard groupings ranging from 1 to 38, according to the capacity needed.

Outstanding features include: high flow rate; cartridge type refill elements are used in standard size 7 5/16 × 18 in.; direct connected or bulk station use; uses either Fullers earth or Navy type cotton waste cartridges; necessary heat can be supplied by either electric heater bands, water or steam.



Honan-Crane Type M purifier



Here Is the ***Simple Reason*** *why*

GATES *Synthetic Rubber* V-Belts

—Are Giving You Even *BETTER SERVICE* Than *Pre-War Belts* of *NATURAL RUBBER!*

NO ONE, before the war, had ever built a V-Belt that could stand the service now required by the Army's tanks, tractors, and self-propelled big guns. Gates has developed V-Belts that are now serving on army combat units all over the world—and has built these belts of synthetic rubber!

This fact is important to you now because every improvement developed by Gates for these Army belts has also been added, day by day, to the quality of the standard Gates Vulco Ropes which have been delivered to you.

It is only rarely, of course, that improvements developed primarily for army combat use can be passed on immediately to the general user—but there are very good reasons why Gates has not been called upon to withhold these important V-Belt improvements from Industrial V-Belt users.

The plain fact is that no guns, no tanks, no airplanes can be produced unless V-Belts are supplied to drive the producing machines. It is equally clear that better V-Belts than ever before have been urgently needed to keep machines going on the forced-draft, war-production schedules that have had to be maintained 24 hours a day!

That is why Gates has been able to embody in the standard Gates Vulco Rope every V-Belt improvement which Gates specialized research has developed for use on the Army's motorized equipment—and that is why you are finding that your standard Gates synthetic rubber Vulco Ropes are today giving you better service than any V-Belts that were ever built before the war.

THE MARK OF Gates SPECIALIZED RESEARCH

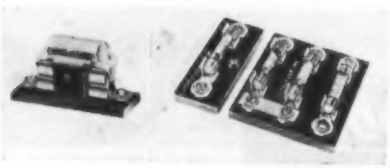
THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO 6, **ILL.** 549 West Washington
NEW YORK CITY 3, 215-219 Fourth Avenue
ATLANTA 3, **GA.** 738 C & S National Bank Building
LOS ANGELES 21, **CAL.** 2240 East Washington Boulevard
DENVER 17, **COLO.** 999 South Broadway
DETROIT 4, **MICH.** 8663 Grand River Avenue
PORTLAND 9, **ORE.** 333 N. W. 5th Avenue
DALLAS 2, **TEXAS** 1710 N. Market Street
SAN FRANCISCO 3, **CAL.** 1090 Bryant Street

Parts and Materials



Littelfuse fuse mounting

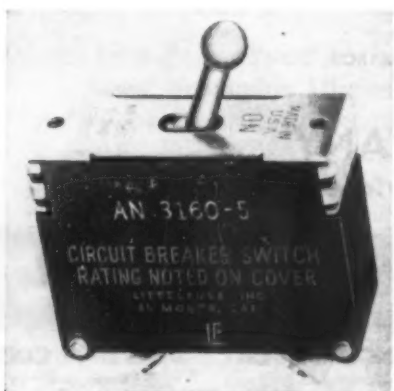
Littelfuse Circuit Breakers And Fuse Mountings Ready

Littelfuse Incorporated, 4757 Ravenswood Ave., Chicago 40, Ill., has announced three new items in its line of fuse mountings and circuit breakers.

Universal fuse panel No. 1505, designed for aircraft and shipboard installation at various accessible points, may be used as a temporary switch or as a break point into which an ammeter can be inserted for temporary reading.

Circuit breaker No. 1560 (AN 3160) withstands extreme temperatures of 350 F or —60 F without breaking. The bi-metal is used as the finger that pulls the trigger. No appreciable mechanical load is exerted on the bi-metal. Its high time lag is said to adapt it to protection of motors and other equipment having high starting surge currents. Range is 5 to 50 amp. at 32 v., ac or dc. It is capable of breaking 2,500 amp. on short circuit.

The Littelfuse Co. No. 1561 Breakerette, which furnishes reset protection in circuit breaker form, is of push breaker type, rated at 32 v., ac or dc. Break is snap action capable of interrupting short circuits of 1,000 amp. in ratings up to 5 amp. and 2,500 amp. in ratings over 5 amp. capacity.

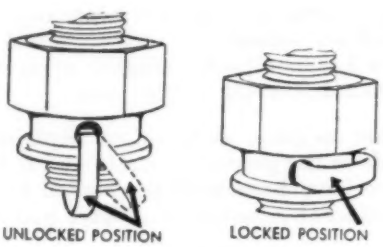


Littelfuse circuit breaker

Durez Announces Compound for Use in Highly Variable Heats

A new phenolic molding compound, durez 12708 natural, specially formulated for use where temperature variations occur frequently, has been announced by Durez Plastics & Chemicals, Inc., Walck Road, North Tonawanda, N. Y. Its low mold-shrinkage factor is said to make it particularly adaptable for use in parts which require metal inserts.

The following statistics apply: specific gravity, 1.84; mold shrinkage, 0.003 in. per in.; water absorption, 4 percent; dielectric strength, 450 v. per mil at room temperature.

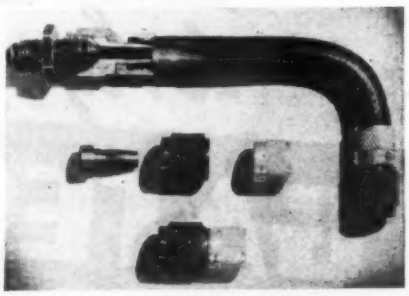


Simlok safety nut

Simlok Safety Nut Easily Installed, Secure in Use

A dual-purpose safety nut featuring installation ease, safety and low cost has been announced by the Simlok Fastener Division of the Simmons Machine Tool Corp., Albany, N. Y. It is held by the engagement of a snap ring in one of a number of longitudinal serrations in the bolt thread. With seven serrations on the bolt thread, there are 14 locking positions per revolution of nut. Fitting any length thread, the nut is locked or unlocked by flipping a ring.

The serrations in the bolt thread are cut by a simple internal broaching tool in a fraction of the time needed to drill cotter pin holes.



Aeroquip hose fitting

Aeroquip Low-Pressure Hose Fittings Take Ordinary Tools

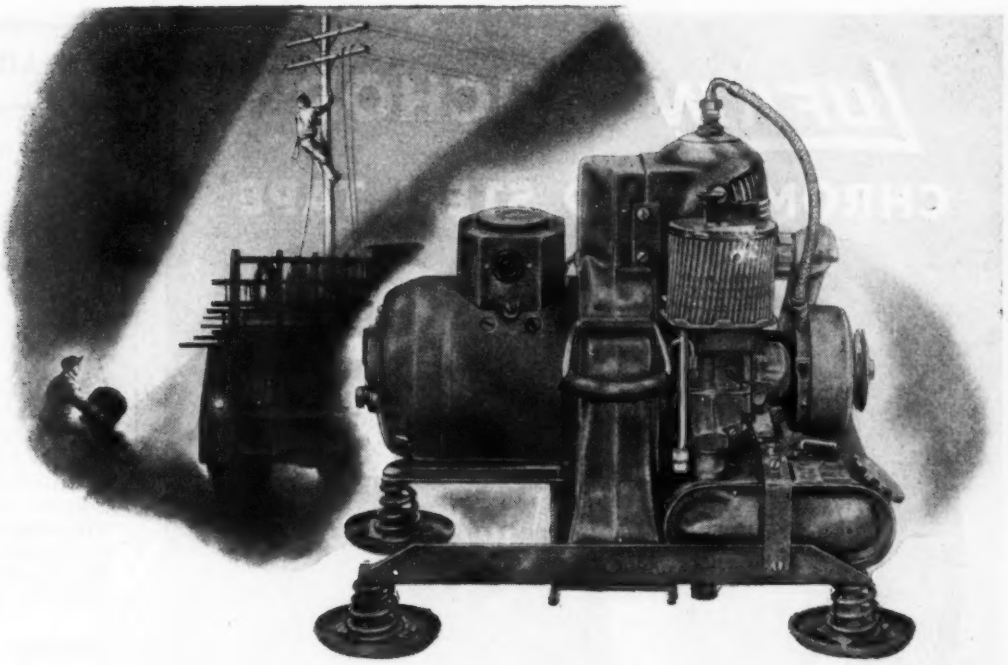
Detachable, reusable hose fittings, manufactured by Aeroquip Corporation, 310 S. East Avenue, Jackson, Mich., are now available for use with low-pressure hose. All parts of the fitting assembly are removable and reusable. Fittings can be assembled and disassembled with a common wrench. Making the assembly involves screwing the fitting together. No tightening or adjusting is required.

Ceramic Coating of Penetray Improves Infra-Red Operation

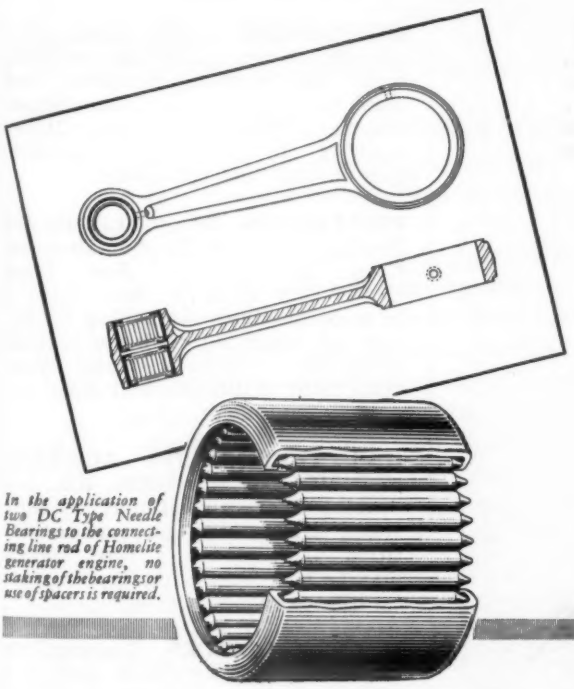
Penetray drying lamps, developed and manufactured by Verd-A-Ray Corporation, Toledo 5, Ohio, have a ceramic coating which is said to give improved wavelength control and to make possible faster, cheaper and easier baking and drying. According to the manufacturer, research has proved that more intensive color, better curing and superior polymerization on metals results.

Penetray lamp

The amber coating reduces glare and lessens attraction to insects, thereby insuring clean work. Lower lamp base temperature is another advantage listed.



Torrington Needle Bearings Double Life on Wrist Pins of Homelite Portable Generators



In the application of two DC Type Needle Bearings to the connecting line rod of Homelite generator engine, no staking of the bearings or use of spacers is required.

The wrist pin bearing of a gasoline engine always takes a beating! To give maintenance-free operation under the impact and stress of extreme service conditions, it must have ample capacity, adequate lubrication, and be designed for long life.

Two DC Type Torrington Needle Bearings in the wrist pin end of the connecting rod of Homelite Portable Generators were found to give *double* the service life in this application.

Can the use of these compact, low-cost, anti-friction bearings increase the performance, improve the efficiency or lengthen the service-life of your equipment? Our engineering staff will be glad to review the matter with you and, if indicated, to work with you in selecting the size and type to meet your design requirements. Write us today. Or, if you wish more preliminary information, consult the Torrington Needle Bearing Catalog No. 30-A. We will gladly send you a copy if you do not already have one on hand.

THE TORRINGTON COMPANY

Established 1866

TORRINGTON, CONN. • SOUTH BEND 21, IND.

"Makers of Needle Bearings and Needle Bearing Rollers"

New York Boston Philadelphia Detroit Cleveland Seattle
Chicago San Francisco Los Angeles Toronto London, England

TORRINGTON NEEDLE BEARINGS

LUFKIN "ANCHOR"

CHROME CLAD STEEL TAPE

CHROME CLAD
TAPE
THE LUFKIN RULE CO.
ARMY
NAVY
EASY TO READ MARKINGS THAT ARE DURABLE
Jet black markings on this Lufkin "Anchor" Chrome Clad Steel Tape are easy to read, even in poor light. Satin chrome finish won't rust, crack, chip or peel.
INCH

Everyone who appreciates mechanical quality likes the Lufkin "Anchor" Chrome Clad Steel Tape. Suitable for all measuring work, this sturdy tape is available in lengths from 25 to 100 feet and marked in feet, inches and eighths or feet, tenths and hundredths. Case is of finest, genuine mahogany-colored leather, closely hand-stitched over a substantial, steel liner. Folding flush handle opens by a push pin. Write for free catalog.

BUY THROUGH YOUR DISTRIBUTOR

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SAGINAW, MICHIGAN · NEW YORK CITY

TAPES · RULES · PRECISION TOOLS

TRADE PUBLICATIONS

BROACHES East Shore Machine Products Co., 835 E. 140 St., Cleveland 10, Ohio, has released Bulletin No. 9 on the Glenny adjustable expansion push broach. Included are advantages of the tool, operating instructions, engineering data and a table of standard specifications and prices.

CASTINGS A four-page bulletin entitled "Meehanite—the Metal for Heat Resisting Castings" has been prepared by the Meehanite Research Institute of America, Inc., Pershing Square Bldg., New Rochelle, N. Y. This Bulletin No. 21 illustrates applications of various heat resisting Meehanite castings and tabulates property data.

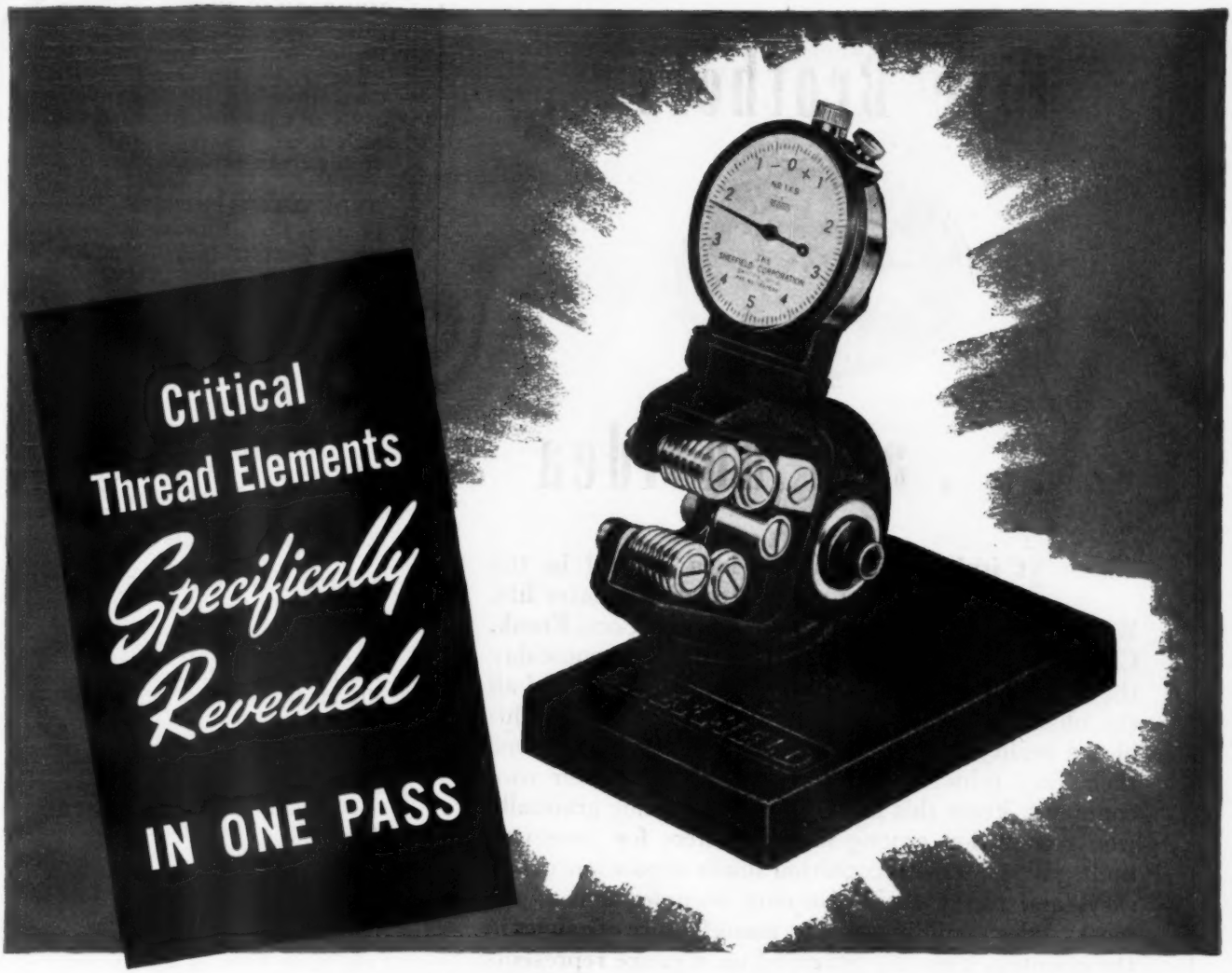
COPPER ALLOYS Five copper base alloys are featured in the revised Duronze Manual available from the Bridgeport Brass Co., Bridgeport, Conn. Technical data and other information on Duronze alloys is given in the form of sheet, strip, rod, wire and tubing for applications where resistance to corrosion, strength, toughness, wearability and ease of manufacture are required. Requests must be made on company letterhead.

DIE CASTING A line of high pressure die casting machines, complete with specifications, features and uses, is presented by Lester-Phoenix, Inc., 2711 Church Ave., Cleveland 13, Ohio, in a handy pocket-size booklet just completed.

DRILLHEADS The Thriftmaster Products Div. of Zimmer-Thomson Corp., 29-05 Review Ave., Long Island City 1, N. Y., has issued a 16-page brochure describing its design of improved multiple spindle drillheads. Cutaway views illustrate both drillheads and their accessory equipment.

GAS TURBINE The Allis-Chalmers Mfg. Co., Milwaukee, Wis., has developed an educational 16 mm. sound film on the gas turbine entitled "Tornado in a Box" which may be borrowed or purchased from the company.

HOLDING DEVICES A manual for engineers, tool designers and machine operators which covers its line of production tools, complete with pertinent engineering data, specifications and prices, has been compiled by Zagar Tool, Inc., 23880 Lakeland Blvd., Cleveland 17, Ohio. Among the equipment presented are holding fixtures, index fixtures, V-H fixtures, speed chucks, collets, broach holders, drill heads and other similar devices.



The Sheffield **THREDCHEK** provides a more *specific* and *accurate* check of critical thread elements than the conventional *collective* check.

Two GO rolls serve to pass parts that are not oversize and which *will* assemble. These rolls screen out parts which are oversize or which will not assemble because of an excessive error or combination of such errors in lead, angle and pitch diameter.

As the parts are passed from the GO or assembly rolls and are presented to the two NOT GO rolls, one of which is mounted so as to actuate a dial indicator, the dial shows whether the pitch diameter is too small and *by how much*. Should the pitch diameter show as being within tolerance limits and near basic, then it can be assumed that lead and angle are not only within tolerance limits but are also of the highest dimensional quality.

A free-rotating backstop enables the part to be properly located for accurate checking and also permits checking for out-of-round. The backstop, together with the indicator, eliminates the need for a trained sense of "feel" in making the NOT GO check—a most important advantage of the THREDCHEK.

Both sets of rolls are PRECISIONPLATE—Sheffield precision chrome plate—for longer life. Full manufacturing tolerances may be utilized because wear allowance is compensated by adjusting the rolls on their eccentric axis. The open end style permits checking close to a shoulder.

THREDCHEKS are available in frame sizes corresponding closely to Sheffield Thread Roll-Snap Gages, with standard or special pitch rolls. *Write for engineering data "Instruments #8".*

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

SHEFFIELD MASTER CRAFTSMEN

MACHINE TOOLS · GAGES · MEASURING INSTRUMENTS · CONTRACT SERVICES

Five Brothers . .

. . . and an Idea

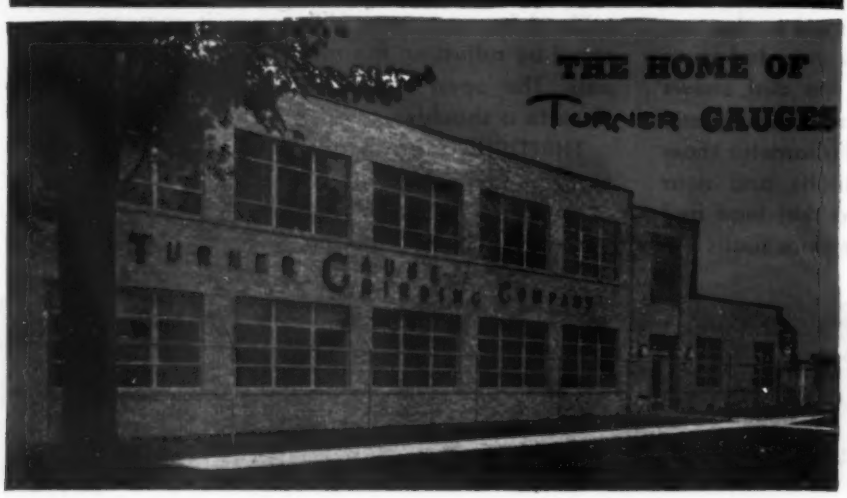
It isn't often that an idea created in the minds of boys will materialize in later life. With the five Turner brothers, William*, Cort, Frank, Charles and Robert, their boyhood idea that some day they would be in business together, overshadowed all the obstacles of hard work and study to make this idea a reality. Finally in April, 1939, they purchased their first grinding machine and formed their own company. From this modest beginning they gradually won recognition among manufacturers for precision-built gauges. This recognition made expansion necessary, and today their company occupies one of the most modern buildings for the manufacture of gauges in the country. The TG stamped on a gauge represents a product backed by the integrity of five brothers and their practical knowledge of precision gauges.

*William Turner, of the U. S. Navy, was killed in action in the Coral Sea Battle.

TURNER BROTHERS

The Stamp TG *of Precision*

TURNER GAUGE GRINDING COMPANY
2625 HILTON ROAD • • FERNDALE 20 MICHIGAN



HYDRAULIC UNITS Bulletin No. 301-U, illustrating and describing a line of hydraulic units, may be secured from the John S. Barnes Corp., Rockford, Ill. The advantages of these units are discussed and for each model pictured a brief account of its particular application is given.

HYDRAULIC PRESSES Chas. E. Francis Co., Huntington, Ind., is offering copies of Bulletin No. L-2 on cold hydraulic presses for all types of laminated work for plywood, plastics, rubber, fiber board and other similar materials.

LIGHTING A booklet on lighting maintenance for industrial plants, commercial buildings and factory yard areas has been prepared by the Westinghouse Plant Lighting Committee and Lighting Div. of the Westinghouse Elec. & Mfg. Co., Edgewater Park, Cleveland, Ohio.

MARKING DEVICES The Noble & Westbrook Mfg. Co., East Hartford, Conn., has issued Supplement No. 43 to its catalog of Noblewest marking machines, introducing the latest additions to its line of precision marking equipment.

METAL SAWING The triple-chip method of circular cold sawing metals is described in a manual offered by The Motch & Merryweather Machinery Co., 718 Penton Bldg., Cleveland, Ohio. In addition, this book covers the required equipment—the blade, the machine that uses it, and the machine that sharpens it, all built by the company.

MILLING A 50-page illustrated milling machine tools and accessories catalog has been issued by the Kearney & Trecker Products Corp. of Milwaukee. This Catalog No. C10 gives complete listings and information on arbors, cutters, vises, high-speed attachments and center scope for standard milling machines.

PLASTIC COATER The Youngstown Miller Co., Sandusky, Ohio, has announced Bulletin No. Ym-800 describing the operation and features of its plastic coaters. Twenty-two different models with a wide range of dipping compartment sizes and melting capacity are featured.

PLASTIC COATING A folder entitled "Amercoat No. 33 Plastic Coating" describes the properties, uses and advantages of this general-purpose cold-applied protective coating. Copies may be had by writing Amercoat Div., American Pipe and Construction Co., P. O. Box 3428, Terminal Annex, Los Angeles 54, Cal.

POT FURNACES Holden pot furnaces for heat treating at any temperature from 300 to 2350 deg. F. with Holden baths are featured in a booklet announced by The A. F.

TODAY'S BEST "BUY" IN CARBIDES . . .

Thanks to modern "quantity production" methods—turning out MILLIONS of STANDARD Carboloy Tools annually—you get top-quality carbide tools at prices comparable to all other cutting tool materials (actually lower than H.S.S. in sizes ¾" sq. and over).

Carboloy "STANDARDS" have full-size long-life tips—strong, cold-drawn steel shanks—and diamond ground, ready-to-use, cutting edges. Entire shank colored for instant identification. Every tool-tip plastic dipped for shipping protection. Standard quantity-packaging with color-label grade identification for convenient ordering and handling.

Priced at 70c each and up. 5 grades, 10 styles for cutting *all* metals. For your best "buy" in carbides, ask for catalog GT-175R.

STANDARD CARBOLOY TRADE MARK TOOLS

CARBOLOY COMPANY, INC. • 11149 E. 8 MILE BLVD. • DETROIT 32, MICHIGAN
Chicago, Cleveland, Houston, Los Angeles, Milwaukee, Newark, Philadelphia, Pittsburgh, Thomaston, Conn.

Conveyors handle a wide variety of commodities—parts, packages, units, cartons, cans, bottles, barrels, bundles, drums, boxes. Available in light, average, or heavy-duty types for portable or stationary use, in a wide variety of sizes, styles, and lengths . . . all built by Standard. They give you substantial savings in time and money. Engineers say that material handling constitutes about 22% of manpower cost . . . cut handling costs and you cut production costs.

Standard Conveyor Company has the experience and facilities to recommend and furnish the right type of conveyor for your particular needs. Write for catalog AM-15 "Conveyors by Standard" — a reference book that will prove very useful to you.

STANDARD CONVEYOR CO.

General Offices: North St. Paul 9, Minn.

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Holden Co., New Haven, Conn. Various types of gas, oil and electric models are described complete with schematic layouts, recommended applications and engineering data.

RESISTANCE WELDING A booklet just published by the Resistance Welder Manufacturers' Assn., 505 Arch St., Philadelphia, Pa., standardizes the nomenclature, definitions and quality of resistance welding equipment. Also included is a chart giving the proper electrodes to be used for spot-welding similar and dissimilar metals, and tables of equivalent ratings, limits of temperature rise and similar data.

RESISTANCE WELDING P. R. Mallory & Co., Inc., Indianapolis, Ind., has published a catalog on "Resistance Welding Electrodes and Alloys." It lists the company's complete line of standard spot welding electrodes and water-cooled holders. A complete listing of "Do's and Don'ts" for improved resistance welding is included as well as a listing of stock sizes of Mallory alloys, their various applications and typical physical properties.

SCALES A wide variety of counting scales in many styles and capacities are described in a circular published by The Howe Scale Co., Rutland, Vt. Included are single, double, triple and all-ratio models with Weightograph, dial and beam indication.

SMALL TOOLS A 92-page catalog, available from the Putnam Tool Co., 2981 Charlevoix Ave., Detroit 7, Mich., covers its line of metal cutting tools complete with specifications and prices. Separate sections are devoted to special purpose tools and engineering data for the tool user. Requests must be made on company letterhead.

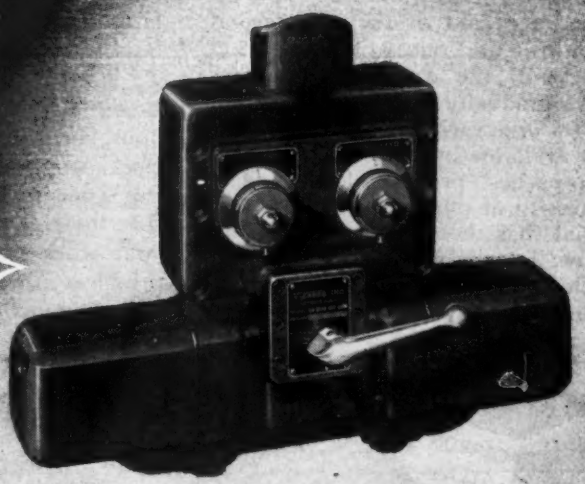
TACHOMETERS Bulletin No. 44-1, released by Jones Motrola Co., Fairfield Ave., Stamford, Conn., describes four models of Jones individual-mount tachometers and the multi-range portable hand tachometer. Full-face and profile views of the models are shown; r.p.m. ranges available, mounting dimensions, uses, operation and general installation information is included.

TANGENT BENDER Struthers Wells Corp., Titusville, Pa., has prepared a folder on its single wing tangent bender which produces the desired shape in one operation from pre-formed sheets. What the machine is, how it works and required information about it are briefly discussed.

THREAD MILLER The Universal U-6 automatic thread miller for internal and external production threading is featured in Bulletin No.

SMOOTH and CONSTANT FEED RATE

regardless of fluctuations in work resistance or hydraulic operating pressure



Double Solenoid Type Push-button Operation

VICKERS "Traverse and Feed Cycle" CONTROL PANELS

These panels provide self-contained, compact control units for automatic machine applications where the cycle is a combination of rapid advance, one or two feeds, and rapid return motions. The two feed rates are infinitely variable within their ranges, and adjustments can be made during feed. Applications include drilling, reaming, boring, turning, milling and swaging machinery.

The hydraulic circuit in the panel employs the well-known Vickers Flow Control Valve in a "metering-out" circuit which means a smooth and constantly maintained feed rate for any given adjustment regardless of fluctuations in cutting tool resistance or changes in hydraulic operating pressure.

Simplicity is evident from the fact that there are only two working parts that move. Many standard modifications are available; feeds can be in either direction or both directions; operation is by single or double solenoids integral with panel, separate solenoids or pilot pressure. Practically any cycle sequence can be obtained. See Bulletin 41-10 for complete information.

Vickers Application Engineers will gladly discuss with you how "hydraulics" can be used to your advantage.

VICKERS *Incorporated*

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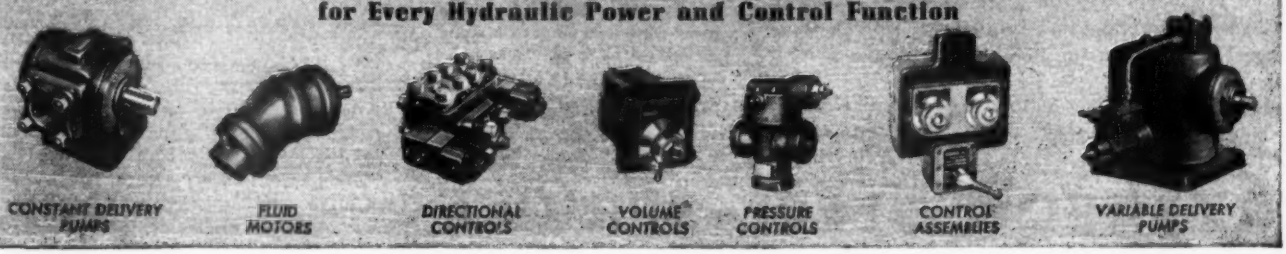
Application Engineering Offices:

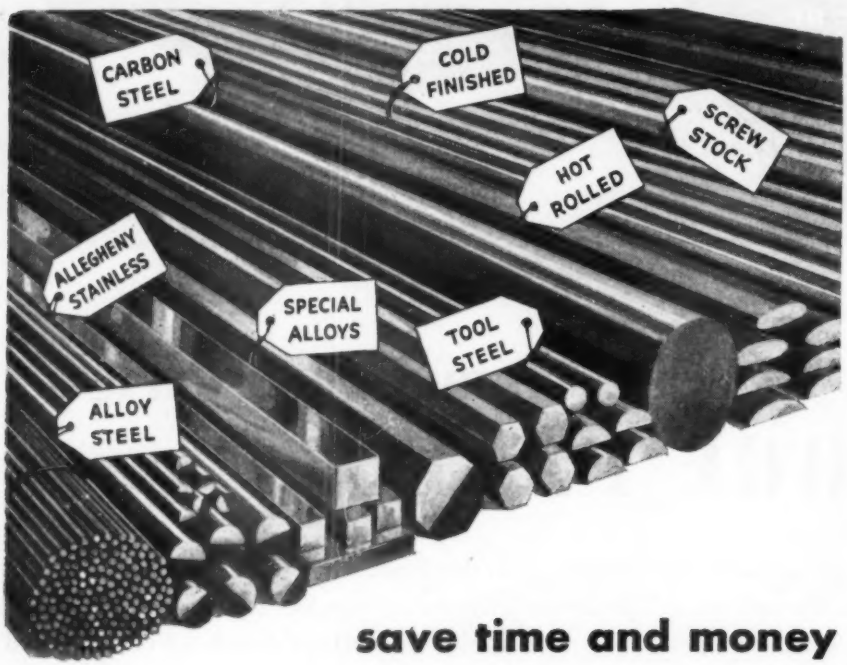
CHICAGO · CINCINNATI · CLEVELAND · DETROIT · LOS ANGELES
NEWARK · PHILADELPHIA · ROCHESTER · ROCKFORD · TULSA · WORCESTER

Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function



NEARBY WAREHOUSE STOCKS OFFER WIDE SELECTION OF STEEL PRODUCTS

Over a period of the past several months, the once depleted steel stocks of the nation's warehouses have gradually grown in both tonnages and variety of sizes. Today, the available steel in some instances approaches pre-war levels. The necessity of offering substitute material has become less frequent. Now, for the most part, it is possible to obtain the exact specification needed for each job. Particularly is this true in the matter of Bars, Plates, and Tubing. Joseph T. Ryerson & Son, Inc., the nation's largest steel-service warehouse organization reports largest stocks in years now on hand awaiting your orders. They point out that the right steel not only makes your work easier, saves labor, and produces a better product, but it is also the most economical.



save time and money

use the RIGHT bar

When specifications call for bar steel, phone Ryerson. You'll save time, trouble and money—get the bar exactly right for your job—because Ryerson stocks include practically every shape and size of bar, in practically every analysis of steel now available. Whether it's straight carbon or alloy, hot rolled, cold finished or heat treated, Ryerson has the right bar in nearby stock and will ship at once. The nation's largest steel stocks are your surest source for just the bar you need.

If you have a question of steel selection or application, experienced Ryerson metallurgists and engineers will be glad to work with you. There is no obligation. Inquiries as well as orders receive prompt attention.

Ryerson Bar Stocks Include:

Allegheny Stainless	Hi-Steel
Alloy	Hot Rolled
Bevel Edge	Mild Steel
Carbon Steel	Octagons
Cold Finished	Ovals
Cold Twisted	Pickled & Oiled
Forged	Reinforcing
Forging Quality	Round Edge
Free Cutting	Screw Steel
Galvanized	Shafting
Half Ovals	Spring Steel
Half Rounds	Stressproof
Heat Treated	Steel
Hexagons	Threaded
High Carbon	Tool Steel

Shapes, Plates, Sheets, Tubes and many other steel products are also in stock for quick shipment.

JOSEPH T. RYERSON & SON, INC. Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

RYERSON STEEL-SERVICE

1044 offered by the Universal Engineering Corp., Cedar Rapids, Iowa. The bulletin lists the advantages of this machine, describes its features, uses, operations and complete specifications and lists accessory equipment.

V-BELTS The B. F. Goodrich Co., Akron, Ohio, has assembled a 74-page V-Belt Handbook for Industrial Applications, which discusses the operating advantages of V-belts, qualities to seek in the product, installation and care, sheaves, selection of the V-drive, and general information covering the field. Included are drive tables and a list of prices.

WELDING The 1945 TWECOLOG, a 12-page catalog, describes fully the complete line of cable connections for electric welding as manufactured by the Tweco Products Co., English at Ida, Wichita 7, Kansas. All items are fully described and priced.

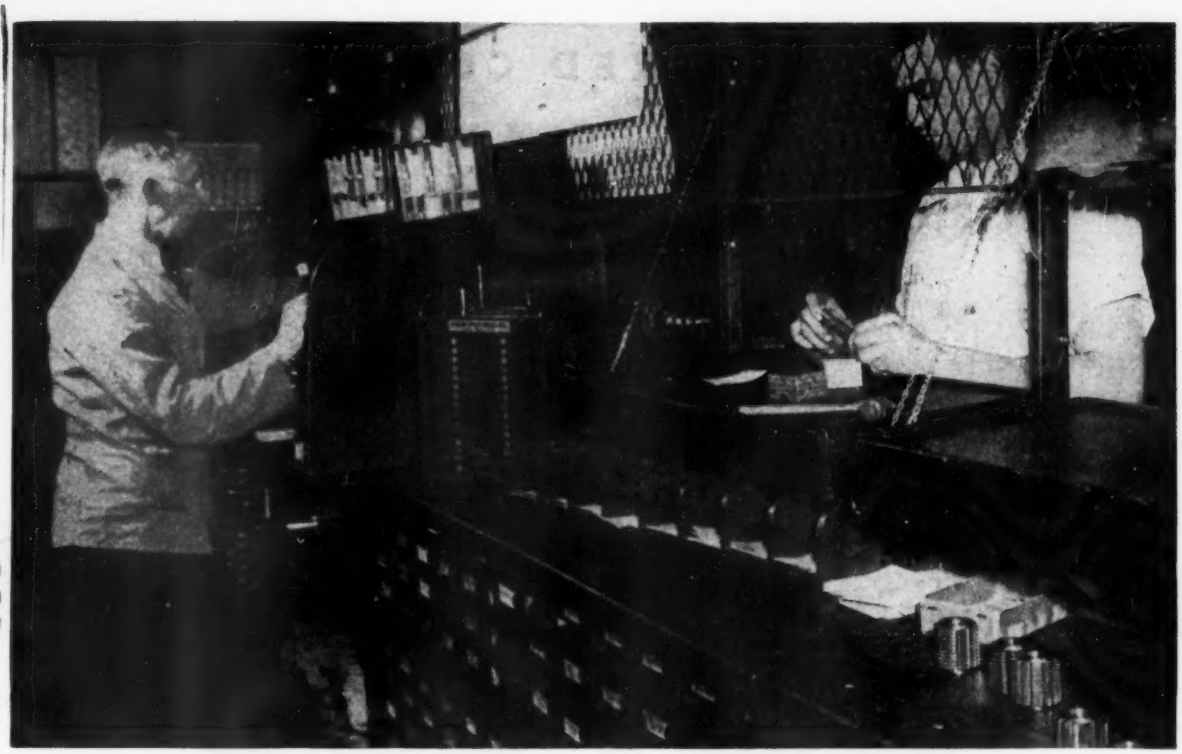
WELDING ELECTRODES The Page Steel and Wire Div. of the American Chain & Cable Co., Inc., Monessen, Pa., has released a book on Page-Allegheny stainless steel welding electrodes. In addition to selection suggestions, the book includes much helpful information on welding procedures and recommendations.

Bright Future Foreseen For Jet-Propelled Planes

JET-PROPELLED PLANES can take off in approximately 30 seconds after they are started, operate satisfactorily with either kerosene or gasoline and, when in full flight, have no visible flames coming out of the exhaust. Such are the revelations made by General Electric Company, manufacturers of gas turbines for the American type jet planes.

Continuous ignition is not required, and hence radio interference and high-altitude problems are eliminated. Because the thrust power which drives the plane forward is produced directly without gearing or a propeller, vibration is minimized and reduced weight per horsepower is made possible, the G-E engineers explain.

Recently, Gen. H. H. Arnold pointed out that great hopes are being held for the jet-propelled plane for future commercial as well as military use. Production schedules for jet-propelled planes are still guarded secrets, but General Electric was permitted to announce last July that it was converting its second largest wartime plant, of more than 600,000 sq.ft. floor space, for the exclusive production of jet propulsion aircraft turbines.



McCaskey contributes to Better Quality through Positive Gage Control . . .

Positive gage control is an essential step in the control of quality. Faulty standards of measurement invariably result in the expensive production of many unsatisfactory parts.

The procedure instituted at *AIR ASSOCIATES, INC., TETERBORO, N. J.*, to prevent such production losses was described by W. Cortlyn Rhodes, Supervisor of Production Engineering, in a recent issue of *Factory Management and Maintenance*.

Control of the issuance and return of gages through the McCaskey Tool Control System is outlined in part as follows:

"Gage is issued to operator who executes tool loan order in triplicate for each item. Attendant marks ticket plainly with serial number of gage issued. Operator receives gage minus gage ticket, which attendant sends back to the gage control department along with duplicate copy of tool loan order.

Attendant subsequently files the original of tool loan order under operator's number in special file and the third in a similar file, according to gage size. These files furnish a complete cross reference on the employee and the item.

If gage is not returned before reinspection date, tool crib is notified and gage is recalled for check. If gage is returned to tool crib prior to periodic inspection (as it is in most cases), it is returned to gage control with third copy of tool loan order. Original copy of tool loan order is removed from operator's file."

McCaskey Tool Crib Control is used in hundreds of plants for the control of gages, general purpose tools, special tools, blue prints, safety equipment and other items loaned to employees as a part of production service. The system pays its way as a result of numerous direct savings.

Reprints of the article "Better Quality Through Positive Gage Control" are available on request. Write today for a copy, together with similar reports of savings through the adoption of McCaskey Tool Crib Control in several other well known plants.

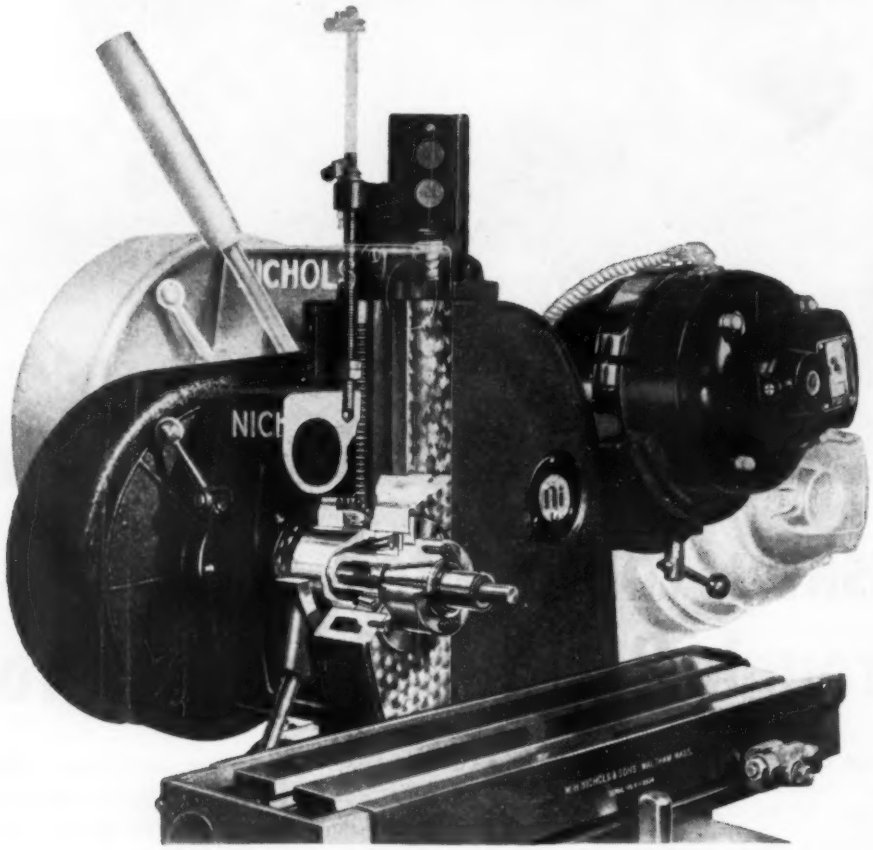
THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Ontario, Canada • *The McCaskey Register Co., Watford, England*

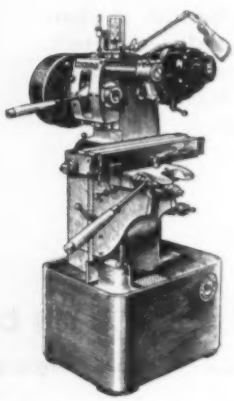
McCASKEY INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • MAINTENANCE • TOOLS • COSTS • PAYROLL

HOW ENGINEERED CONSTRUCTION GIVES NICHOLS RISE-AND-FALL SPINDLE RIGIDITY PLUS MOBILITY



"THE MILLER THAT USES ITS HEAD"



Lock the Nichols Miller's rise-and-fall spindle head in any position and it is set as rigidly as a fixed spindle. Use it sliding-head fashion and equal rigidity is maintained, while at the same time providing the added advantage of mobility in operation.

That's because every part—from the cutter through the spindle, head, arm and motor—is Nichols precision engineered and *solidly joined to produce a "single-mass" effect.* This patented construction assures the complete absorption of any shock starting at the cutter.

Effective counter-balance enables the operator to move the sliding-head up-or-down to any position with little effort to bring the cutter to the work...makes possible simple, rigid fixtures which reduce set-up time.

This unique Nichols combination provides chatter-free performance, the key to fine finishes and tolerances in "tenths."

Put the Nichols Miller to work for high-speed *precision* production.

THE NICHOLS MILLER

MANUFACTURED BY W. H. NICHOLS & SONS, WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS: NICHOLS-MORRIS CORP., 40 CHURCH ST., NEW YORK 7, N. Y.

SATISFYING THE WORLD'S TOUGHEST CUSTOMER

INVISIBLE ARMOR

Around every American vessel in dangerous waters today is a broad band of "invisible armor" – the electrical field of a DeGaussing belt – protecting it against magnetic mines.

These mines took a terrific toll of shipping early in the war. Buried deep in the sea they were difficult to detect and remove. Any ship passing within the magnetic field of a mine detonated it; force of the explosion was sufficient to crumple steel hulls many feet away.

Prompt installation of DeGaussing equipment was the answer to this enemy weapon. Star was called upon to help. Here again the U. S. Navy was a "tough customer" to satisfy – the Bureau of Ships demanded motor-generator sets that established new standards for compactness and ability to resist shocks and strains; called for quick delivery.

While the Navy does not endorse any product, the fact that Star was able to design and build the special equipment for DeGaussing installations, and maintain unfailing delivery schedules, is ample evidence of the high engineering skill of this organization. That engineering skill is available for your use in solving industrial motor problems. Star Electric Motor Company, 200 Bloomfield Avenue, Bloomfield, New Jersey.

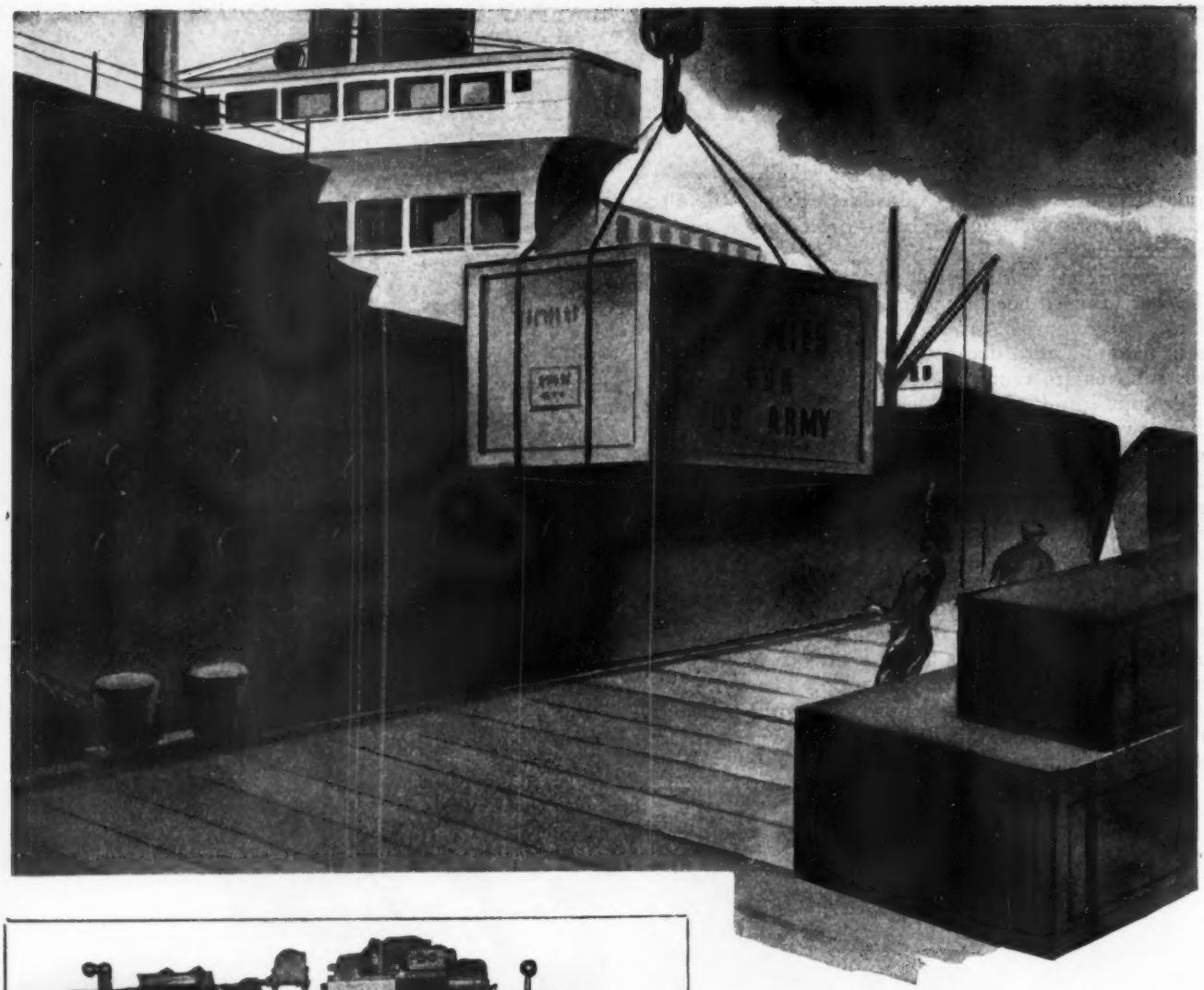
Let Us Help Solve Your Special Problems

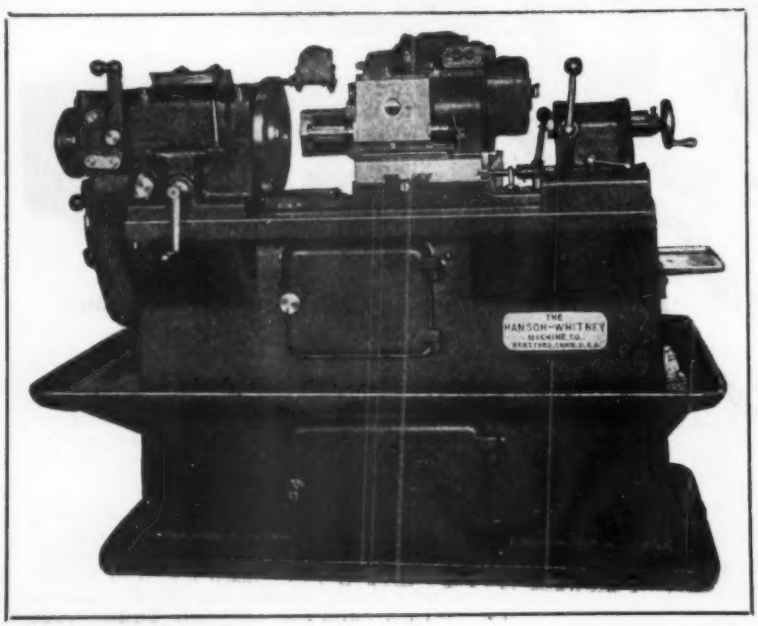
Motor-generator set, above, was designed and built by Star to meet special U. S. Navy requirements on voltage, compactness, resistance to shocks and strains. Occupies only half the space required for comparable sets.

Star's record in designing motors and generators for many Navy needs is proof of our ability to solve your difficult motor problems. A standard Star (⅛ to 200 H.P.) may handle your job; if it doesn't we'll build one that will Discuss your post-war plans with us now.

STAR MOTORS

POWER PACKAGED AS YOU NEED IT





A PRACTICAL ANSWER

The tempo of production must match that of invasion. H-W Semi-Automatic Thread Milling Machines are geared to this increased tempo . . . producing precision threads in one revolution . . . either external, internal or taper, right or left hand . . . cutting down-time . . . minimizing scrap . . . helping many a United Nations plant to meet the urgent needs of War. We can give you the practical answer to your threading problems . . . quickly.

ARMY E NAVY

THE HANSON WHITNEY MACHINE CO.

HARTFORD CONNECTICUT U.S.A

Save these for work a machine can't do

HC-5—½ H. P., multi-speed countershaft unit, 900 to 3600 R. P. M. Mounted bench-height on 3-leg caster base, 360° swivel.

There was a time, not so many years ago, when the words "Made by Hand" were synonymous with highest quality. In some things this still holds true.

But it is equally true that many operations can be done better and faster, with a greater degree of efficiency, when a Haskins Flexible Shaft Machine is used. And this with much less strain and fatigue on the part of the operator.

Grinding—Sanding—Rotary filing—Wire brushing—Buffing and Polishing—all are machine operations. There are many more. Write for Catalog 45, showing many ways to save your hands and speed production with flexible shaft equipment.

HASKINS
Flexible Shaft
EQUIPMENT

More VERSATILE Machines for
More PROFITABLE Work

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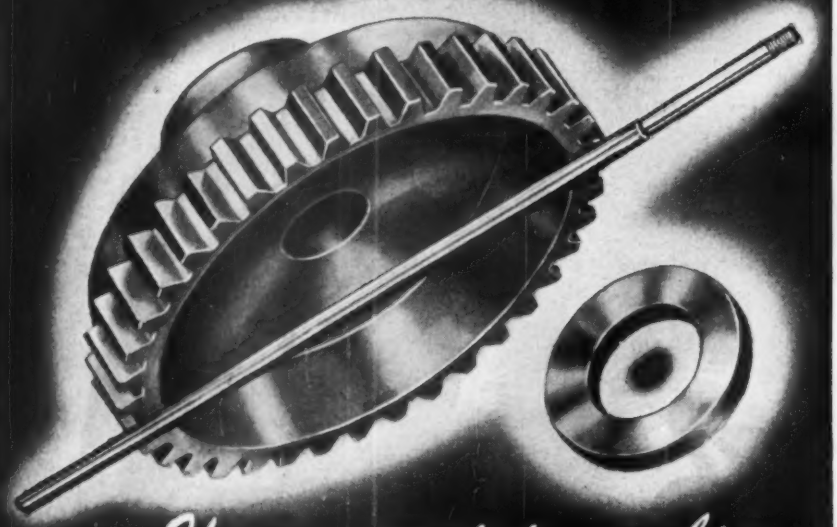
COLD FINISHED (.40-.50) CARBON OPEN HEARTH

SPEED TREAT STEEL



If you want to combine

FLAME or INDUCTION HARDENING with *FAST* MACHINING use *SPEED TREAT STEEL!*

You will obtain perfect results. Flame or induction hardening of *SPEED TREAT STEEL* results in hardness of 60 to 62 Rc. with water quench and 56 to 58 Rc. with oil quench.

The FAST MACHINING qualities of SPEED TREAT STEEL are known coast to coast in plants which are *increasing production* from 35% to 55% and reducing scrap losses from 50% to 75%. It is eliminating warpage and breakage, doubling tool life. Actual dollar savings are running as high as $69 per ton of steel used.

BUY WAR BONDS

SPEED TREAT ECONOMICALLY REPLACES C1043-C1046-C1137 and C1144. *USE SPEED TREAT STEEL!*

Our Metallurgists Are At Your Service

WRITE FOR SPEED TREAT CATALOG

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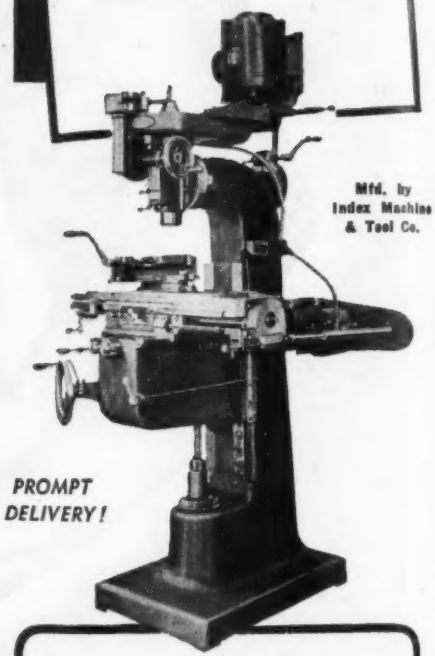
YOUNGSTOWN, OHIO

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

INDEX VERTICAL MILLS FOR THE TOOL ROOM OR PRODUCTION LINE

Milling, Drilling or Boring. Verniers or Rods and Indicators for locating. Ask the shop that has one. Better still, ask the shop that has an Index and also another of competitive make.



Mfd. by Index Machine & Tool Co.

PROMPT DELIVERY!

12" Tool Room Rotary Table

Mfd. by Index Machine & Tool Co.

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

For use on Index Mills or any other machine that will accommodate a 12" table.

BLANK and BUXTON MACHINERY

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SOCKET SCREWS FOR *Stronger* FASTENINGS

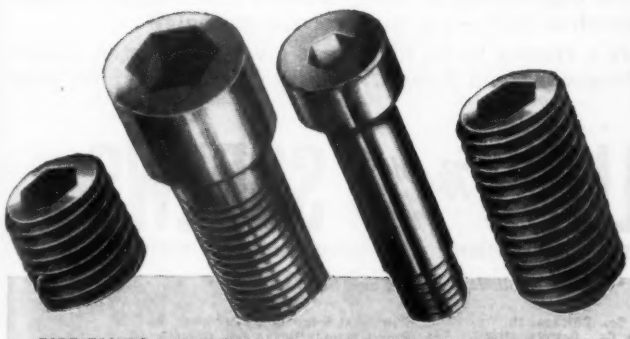
RULE OUT FAILURES WITH PARKER-KALON *Controlled Quality*

Greater holding power – resistance to severe stresses – these are two of the many good reasons for using Socket Screws in your product assembly.

That's why it's good judgment to choose Socket Screws that give you predetermined assurance of dependable strength – screws held to exacting standards of trouble-free performance by Parker-Kalon's Quality-Control routine.

Unequalled in the industry for scientific thoroughness, this continuous check-up of every mechanical and physical characteristic rules out "doubtful" screws – screws that *look* all right, but some of which fail to work right. Tests and inspections cover Chemical Analysis; Tensile and Torsional Strength; Ductility; Shock Resistance under Torsion and Shear; Hardness; Head and Socket Size; Thread Fit.

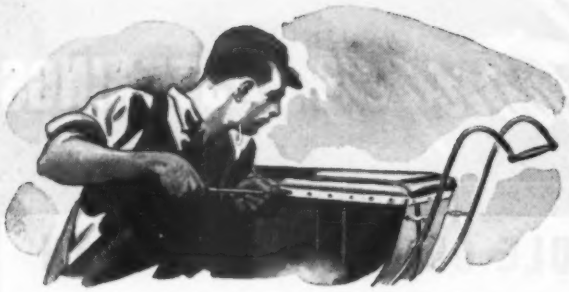
Specify Parker-Kalon Socket Screws next time you order . . . they cost no more. Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.



PIPE PLUGS CAP SCREWS STRIPPER BOLTS SET SCREWS

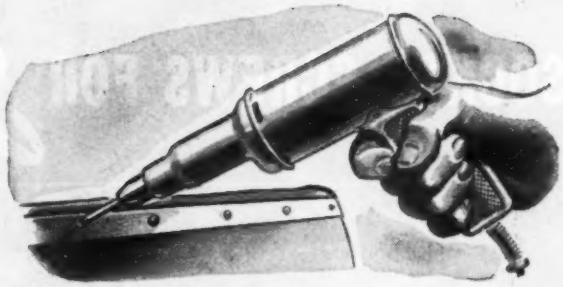
PARKER-KALON Quality-Controlled SOCKET SCREWS

A product of PARKER-KALON . . . Specialists in Fastening Devices



IT'S A TIME SAVER!

So long as his plant stuck to slotted screws, this assembly man had to stick to hand driving. Too much danger of power drivers skidding and gouging the carriage's finished surface – making costly refinishing necessary.



IT'S A MONEY SAVER!

A shift to Phillips Screws permitted a switch to power driving. Thanks to the Phillips Recess, driver skids stopped. Result: a fast, money-saving process instead of a slow, high-cost hand operation!

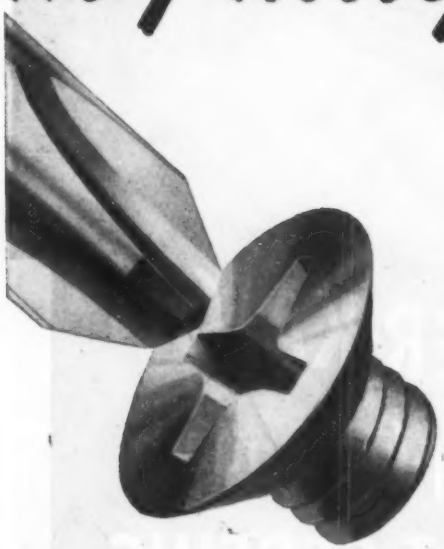
IT'S A PROBLEM SOLVER!

Management and workers aren't the only ones who benefit from Phillips Screws. Design Engineers find there's no easier way to plan extra fastening strength and rigidity into a modern streamlined product – and to lower costs at the same time!

IT'S A SALES BUILDER!

To salesmen, too, use of Phillips Screws pays dividends: in a stronger, smarter product . . . that has no burred screw heads to disfigure surfaces and snag clothing. Ornamentally as well as functionally, this recess is engineered to SELL your product!

It's Phillips — the engineered recess!



In the Phillips Recess, mechanical principles are so correctly applied that every angle, plane, and dimension contributes fully to screw-driving efficiency.

. . . It's the exact pitch of the angles that eliminates driver skids.

. . . It's the engineered design of the 16 planes that makes it easy to apply full turning power – without reaming.

. . . It's the "just-right" depth of recess that enables Phillips Screw Heads to take heaviest driving pressures.

With such precise engineering, is it any wonder that Phillips Screws speed driving as much as 50% – cut costs correspondingly?

To give workers a chance to do their best, give them faster, easier-driving Phillips Recessed Head Screws. Plan Phillips Screws into your product now.

PHILLIPS *Recessed Head* SCREWS

WOOD SCREWS • MACHINE SCREWS • SELF-TAPPING SCREWS • STOVE BOLTS

Made in all sizes, types and head styles

24 SOURCES

American Screw Co., Providence, R. I.
Atlantic Screw Works, Hartford, Conn.
The Bristol Co., Waterbury, Conn.
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Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
General Screw Mfg. Co., Chicago, Ill.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
Manufacturers Screw Products, Chicago, Ill.
Milford Rivet and Machine Co., Milford, Conn.
The National Screw & Mfg. Co., Cleveland, Ohio
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Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
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Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Manufacturing Co., Waterville, Conn.
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The Southington Hardware Mfg. Co., Southington, Conn.
Wolverine Bolt Co., Detroit, Mich.

Billions of $'s in Postwar Prosperity Will Stay Locked Up... Unless We All Help to

Solve Industry's No. 1 Problem

... creating more jobs with high wages by producing *more and better products at a lower cost*

In spite of the pent-up demand created by the past few years of high earnings and restricted purchasing — John Q. Public is going to be mighty cagey when it comes to cashing in his war bonds or depleting his savings account.

The great amount of publicity given to the development of new products has sold future buyers on the fact that American industry and genius will soon deliver better, new products at a lower cost. And, having done without this long, John Q. Public is going to "wait and see."

Realizing this fact, leading manufacturers of production and processing equipment are modernizing their designs with every determination of helping to solve this vital No. 1 problem of all industry.

Business leaders know that only through soundly stimulated demand can they create increased production — and provide more jobs with high wages.

Century Motors Help to Reflect Lower Costs

Of course, machine tools and other processing equipment will play an important part in building and maintaining postwar prosperity — but electric motors are production tools, too, because they are a component part of the machines they drive.

Century Motors offer specialized advantages such as — a wide variety of motor types to match the functional characteristics of production operation—unusual freedom from vibration that contributes to closer tolerances in high speed, precision production—motor protection features that mean uninterrupted production in spite of hazardous atmospheres—peçmanently quiet operation that results in less waste of human energy—and many other specialized features that reflect lower final costs.

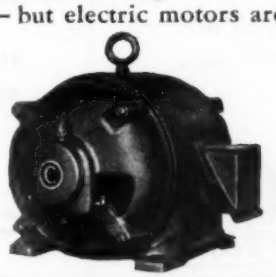
Century's Organization Helps, Too

Century's national organization of Motor Specialists has long helped appliance manufacturers and machine tool builders to effect savings in original design and in production output costs. They can help you best when your machines or your products are still in the blueprint or experimental stage.

Everyone Benefits from Century's Performance

Whether you are a manufacturer of consumer products or industrial equipment, a wholesaler or retailer—you, too, have a direct or indirect stake in how well Century Motors can help others in solving the problem of delivering a better product at a lower cost.

Act Now — If you are a manufacturer of Motorized Equipment or Appliances, it will pay you to call your nearest of Century's 31 branch offices.



Century C MOTORS

409

CENTURY ELECTRIC COMPANY • 1806 Pine Street, St. Louis 3, Missouri

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To protect your product against costly failures due to

WEAR
IMPACT
FATIGUE
CORROSION
. . . use parts of
AMPCO
Metal
. . . an engineered alloy of closely controlled quality, from the only completely-equipped, self-contained source of aluminum bronze parts.

Nowhere else can you obtain *all* of these benefits, to enhance the salability, performance, and reputation of your product:

1. Distinctive properties of resistance to wear, impact, fatigue, corrosion.
2. A series of engineered alloys—with physical properties to fit your application.
3. Quality control to hold these properties within narrow limits.
4. Diversified production facilities, coordinating in one place all the commonly used metalworking processes.
5. Engineering and production "know-how" to give you a practical manufacturing program.
6. A nation-wide organization of field engineers to assist you.
7. A record of proved performance in hundreds of leading makes of equipment.
8. A national reputation that makes Ampco Metal parts a sales asset.

Send us your prints when you are ready to consider materials. Write for bulletins. *Ampco Metal, Inc., Dept. AM-1, Milwaukee, Wisconsin.*

Ampco Field Offices in Principal Cities.

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A-7B

IMMEDIATE DELIVERY

No. 1 to 60
New High Speed
Long Length

DRILLS

No. by Gage	*Length*	*Our Price Net Each*
1 to 10	6¼	$ .75
11 to 20	5¾	.75
21 to 30	5⅜	.75
31 to 40	5¼	.75
41 to 50	4½	.75
51 to 60	4¼	.75

If you buy 60 drills or more — 20% discount

VICTOR
MACHINERY EXCHANGE INC.
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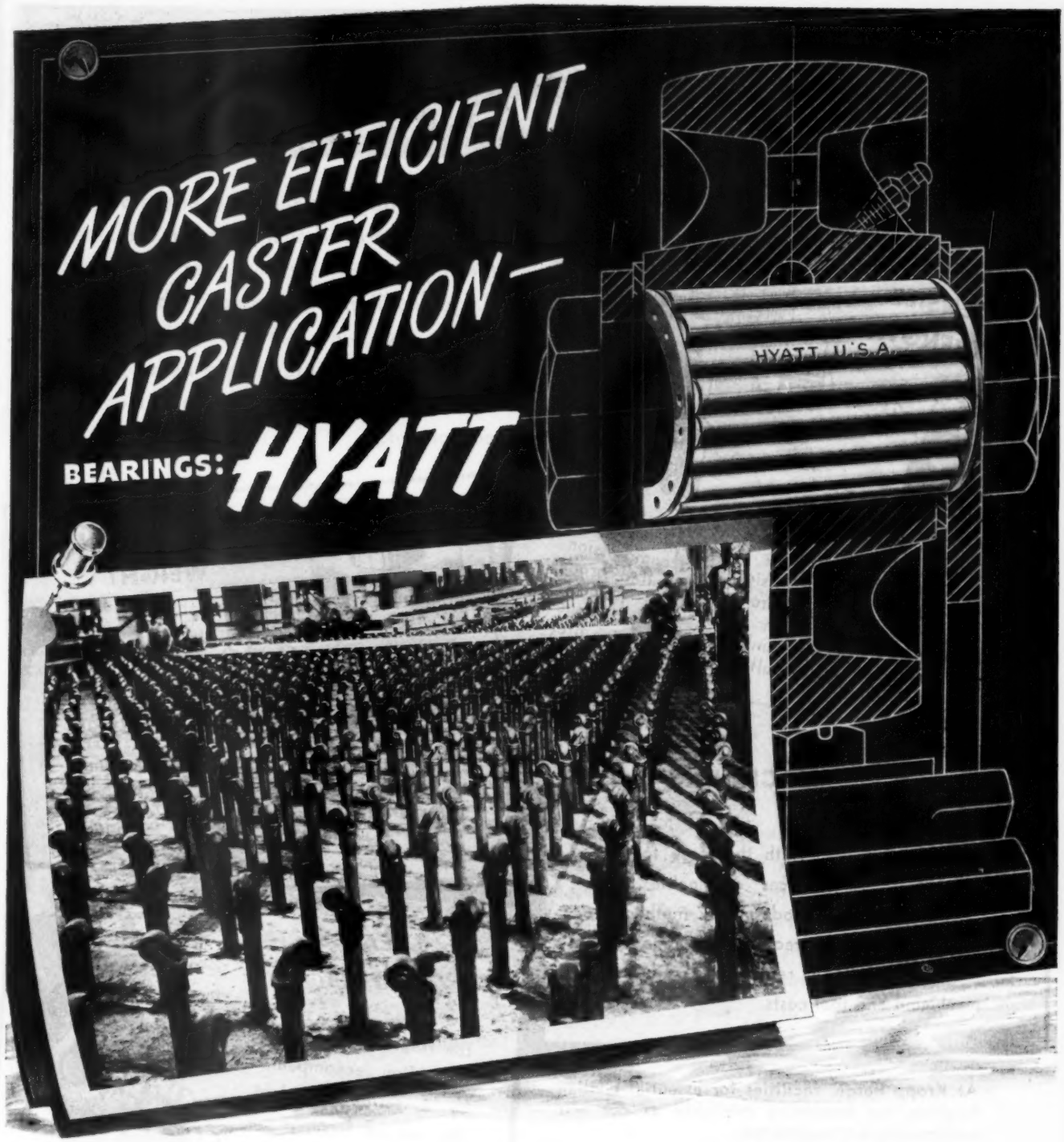


Casters in this bed made by Service Caster & Truck Division of Domestic Industries, Inc. Albion, Michigan

Easier rolling of plates and less frequent lubrication on a caster-bed application, in a large Chicago steel plant, was obtained using Hyatt Roller Bearing equipped casters.

This is one of many instances where Hyatt Roller Bearings have speeded up and simplified steel mill operation. Other applications are in tables, cranes, cars and mill motors. Let us help solve your bearing applications.

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION

HARRISON, NEW JERSEY • CHICAGO • DETROIT • PITTSBURGH • OAKLAND, CALIFORNIA

WHY MORE FORGINGS IN YOUR POST-WAR PRODUCTS ?

The advantages of the broader use of forgings have proved themselves in armament making to such an extent that the nation's forge facilities were taxed to their utmost during the peak war production period. These same advantages are being utilized by designers of postwar machines and equipment.

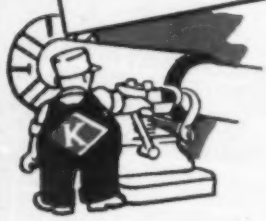
HIGH TENSILE STRENGTH

Forgings provide metals at their ultimate strength and toughness, with maximum resistance to tensional, torsional and compression stresses; obtained through controlled grain flow, resulting from the forging process. Forged parts also embody the high fatigue resistance which results in longer service life.

SAVINGS IN WEIGHT

The forging process produces maximum strength, permitting use of thinner metal sections, resulting in parts of less weight. Valuable space may also be saved. These are important considerations in many postwar machines.

LOWER MACHINING COSTS



With the close tolerances obtainable by modern day methods, forgings generally require less time to machine and finish; resulting in reduced machining and tool costs.

GREATER SAFETY

The fracture of a part is too often accompanied by a serious accident. The use of forgings for stressed parts affords the highest safety factor.

At Kropp Forge, facilities for essential civilian forgings are becoming available as our war assignments are completed.

When you need flat die, drop or upset forgings, call the nearest Kropp engineering representative, or write direct for information or quotation.

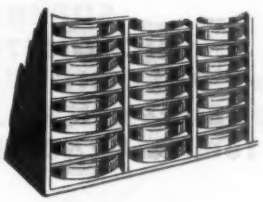
KROPP FORGE COMPANY
5301 W. Roosevelt Road, Chicago 50, Ill.
Engineering Representatives In Principal Cities

SERVING INDUSTRY FOR 31 YEARS
KROPP FORGE CO
OVER 100 YEARS

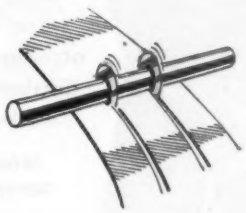
KROPP

ARMY ★★ ★★ NAVY

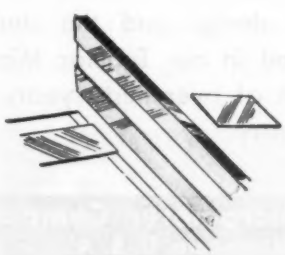
Practically Anything You Need In *Spring Steel*... Shipped From Stock



COMPLETE STOCKS



SLITTING



SHEARING

WE STOCK IT—just about every grade and type of spring steel you can use. Purdy sells more of this precision metal than any other warehouse in the country. Two reasons for our fast deliveries are high speed slitters that narrow down coil spring strip to any specified width, and powerful shears that lop off the lengths you want—in a hurry. It all adds up to this: — your order gets shipped without any delay.

Picking the right spring steel poses no problem when you buy from Purdy. Specializing on springs for over 30 years, we've garnered a tremendous store of technical knowledge for your benefit. Tell us what your springs must do — and we'll recommend the best performing grade and type of steel . . . truck it to you in one day if you are in the Metropolitan New York area . . . ship it overnight by express elsewhere.

A. R. Purdy Co.
INCORPORATED

792 Greenwich Street, N. Y. C.
Lyndhurst, New Jersey

SPRING STEELS • BLUE TEMPERED AND POLISHED • COLD ROLLED ANNEALED, available in coils, straight lengths and in S.A.E. 1095 and 1070 • SPRING WIRES OF ALL TYPES • HOT ROLLED CARBON AND ALLOY BAR SPRING STEEL • HOT ROLLED CARBON SPRING STEEL SHEETS

PLANET

Courtesy of
RIVETT LATHE &
GRINDER INC.,
Boston, Mass.

RIVETT
"UNIVERSAL"
Milling Attachment
for Rivett Bench Lathes

ALLEN

FLAT HEAD CAP SCREWS

This application on a RIVETT Lathe shows how to get the HOLDING-POWER of hex socket screws in such an essentially flush-surface part as a knee or a slide rest. The V-head of the Allen screw fits the counterbore with complete *closed contact* all round. This gives frictional grip and a locking rigidity, reinforced by the tightest of set-ups possible only by powerful wrenching with an Allen Hex Key.

The ALLEN Flat Head Cap Screw is "pressur-formd" of Allenoy steel, with uncut metal fibres shaped to the head. Threads also are *pressur-formd,* with tolerances held to a high Class 3 fit. Strength and precision distinguish these screws in all their applications.

Procurable from your local ALLEN *Distributor; ask him for samples and dimensional data.*

The Allen Mfg. Company ★ ALLEN ★ Hartford, Conn., U. S. A.

AISI HY-TEN SAE

NE

ALLOY STEELS FOR VICTORY

Scientifically selected to conserve critical alloys and meet the requirements of the AIRCRAFT, ORDNANCE, and MACHINE TOOL industries.

Complete "EARMARKED" stocks of Aircraft alloy steels at Buffalo and Detroit.

Wheelock, Lovejoy & Co., Inc.

138 Sidney Street
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SUPERIOR MICROMETERS for "PRECISION" MEASUREMENT . . . A Tumico TRADITION

Today Tumico Micrometers enjoy the world wide acceptance of discriminating workmen.

PROMPT DELIVERY!

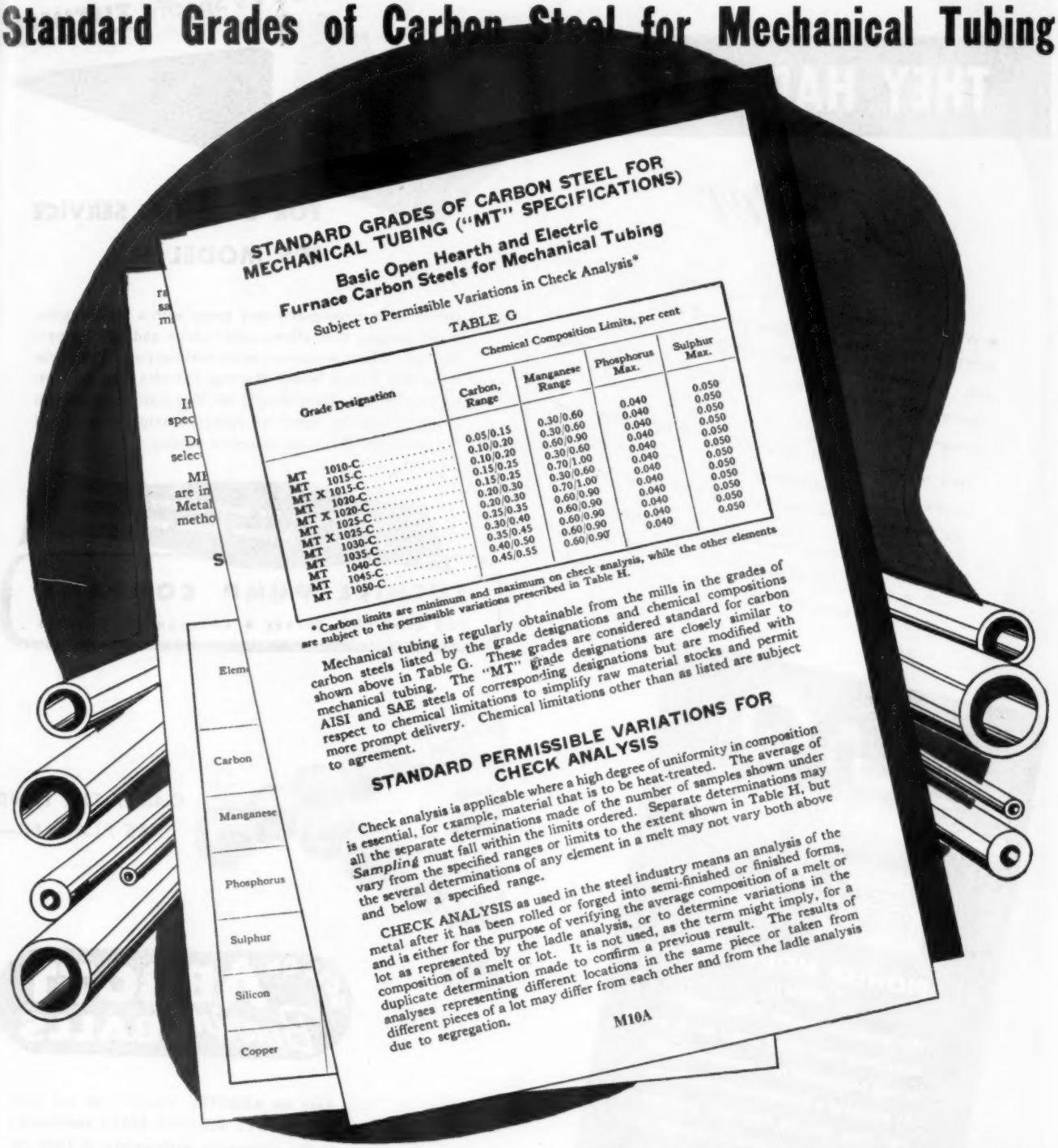
TRADE TUMICO MARK

The excellence in design and the sturdy construction you find in our Tubular Micrometers is the result of over thirty years of service to the industry.

The Tubular Micrometer Company
St. James, Minnesota, U. S. A.

Here are the "MT" SPECIFICATIONS . . .

Standard Grades of Carbon Steel for Mechanical Tubing



STANDARD GRADES OF CARBON STEEL FOR MECHANICAL TUBING ("MT" SPECIFICATIONS)

Basic Open Hearth and Electric Furnace Carbon Steels for Mechanical Tubing

Subject to Permissible Variations in Check Analysis*

TABLE G

Grade Designation	Chemical Composition Limits, per cent			
	Carbon, Range	Manganese Range	Phosphorus Max.	Sulphur Max.
MT 1010-C	0.05/0.15	0.30/0.60	0.040	0.050
MT 1015-C	0.10/0.20	0.30/0.60	0.040	0.050
MT X 1015-C	0.10/0.20	0.60/0.90	0.040	0.050
MT 1020-C	0.15/0.25	0.30/0.60	0.040	0.050
MT X 1020-C	0.15/0.25	0.70/1.00	0.040	0.050
MT 1025-C	0.20/0.30	0.30/0.60	0.040	0.050
MT X 1025-C	0.20/0.30	0.70/1.00	0.040	0.050
MT 1030-C	0.25/0.35	0.60/0.90	0.040	0.050
MT 1035-C	0.30/0.40	0.60/0.90	0.040	0.050
MT 1040-C	0.35/0.45	0.60/0.90	0.040	0.050
MT 1045-C	0.40/0.50	0.60/0.90	0.040	0.050
MT 1050-C	0.45/0.55	0.60/0.90	0.040	0.050

* Carbon limits are minimum and maximum on check analysis, while the other elements are subject to the permissible variations prescribed in Table H.

Mechanical tubing is regularly obtainable from the mills in the grades of carbon steels listed by the grade designations and chemical compositions shown above in Table G. These grades are considered standard for carbon mechanical tubing. The "MT" grade designations are closely similar to AISI and SAE steels of corresponding designations but are modified with respect to chemical limitations to simplify raw material stocks and permit more prompt delivery. Chemical limitations other than as listed are subject to agreement.

STANDARD PERMISSIBLE VARIATIONS FOR CHECK ANALYSIS

Check analysis is applicable where a high degree of uniformity in composition is essential, for example, material that is to be heat-treated. The average of all the separate determinations made of the number of samples shown under *Sampling* must fall within the limits ordered. Separate determinations may vary from the specified ranges or limits to the extent shown in Table H, but the several determinations of any element in a melt may not vary both above and below a specified range.

CHECK ANALYSIS as used in the steel industry means an analysis of the metal after it has been rolled or forged into semi-finished or finished forms, and is either for the purpose of verifying the average composition of a melt or lot as represented by the ladle analysis, or to determine variations in the composition of a melt or lot. It is not used, as the term might imply, for a duplicate determination made to confirm a previous result. The results of analyses representing different locations in the same piece or taken from different pieces of a lot may differ from each other and from the ladle analysis due to segregation.

M10A

Mechanical Tubing "MT" grade designations are closely similar to AISI and SAE steels of corresponding designations but are modified with respect to chemical limitations to simplify raw material stocks and permit more prompt delivery.

The "MT" standard grades are shown in the table above and chemical limitations other than as listed are subject to agreement. A full size copy of the bulletin above is available upon request or may be found in the Pittsburgh Mechanical Tubing Catalog.

PITTSBURGH STEEL COMPANY
PITTSBURGH 30, PA.

THEY HAD TO BE

Better

★ WHEN a product is better, it usually "goes places"—and PIONEER Pumps have really gone far and wide, to do a fine job. The reason is quite simple—PIONEER Pumps are better through and through, and they're on busy production machines everywhere.

They are quality built pumps—designed by machine tool engineers who wanted better pumps to provide the coolants for the precision machines which they were designing.

Today, there are more than 400 standard PIONEER models with a wide range of applications—and all with the reputation of being the "longest-lived" pumps ever built.

PIONEER MODEL "P"
(PULLEY)

This particular model is for applications other than direct motor drive, or it may be coupled to a standard motor by means of a flexible coupling. Model "P" may also be had with a motor base, to accommodate a regular or special type power unit.

PIONEER Pumps

Pioneer Pump & Manufacturing Co.
19651 JOHN R ST. • DETROIT 3, MICHIGAN

WHEN YOU NEED PRECISION-BUILT SMALL PUMPS . . . *Specify* TUTHILL

FOR COOLANT SERVICE
IT'S MODEL M

Here's an internal-gear rotary pump with a built-in automatic by-pass that allows small chips and grit to pass through without serious injury to working parts. Precision-built, this Tuthill Model M pump provides long, uninterrupted service. Sizes from 1 to 50 g.p.m. Available in stripped form for direct incorporation into the design of the machine. Write for complete catalog.

★

Tuthill Pumps are serving Army • Navy Air Force • Merchant Marine and Industry

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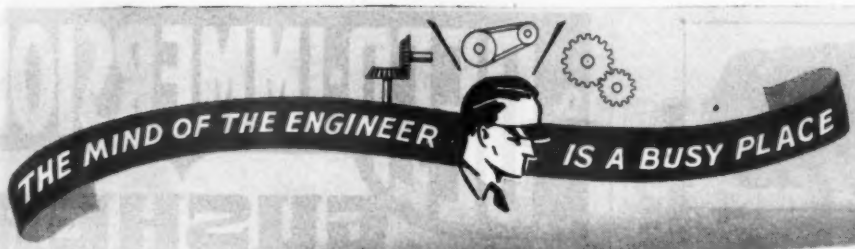
CARRY THE LOAD AS PLANNED—

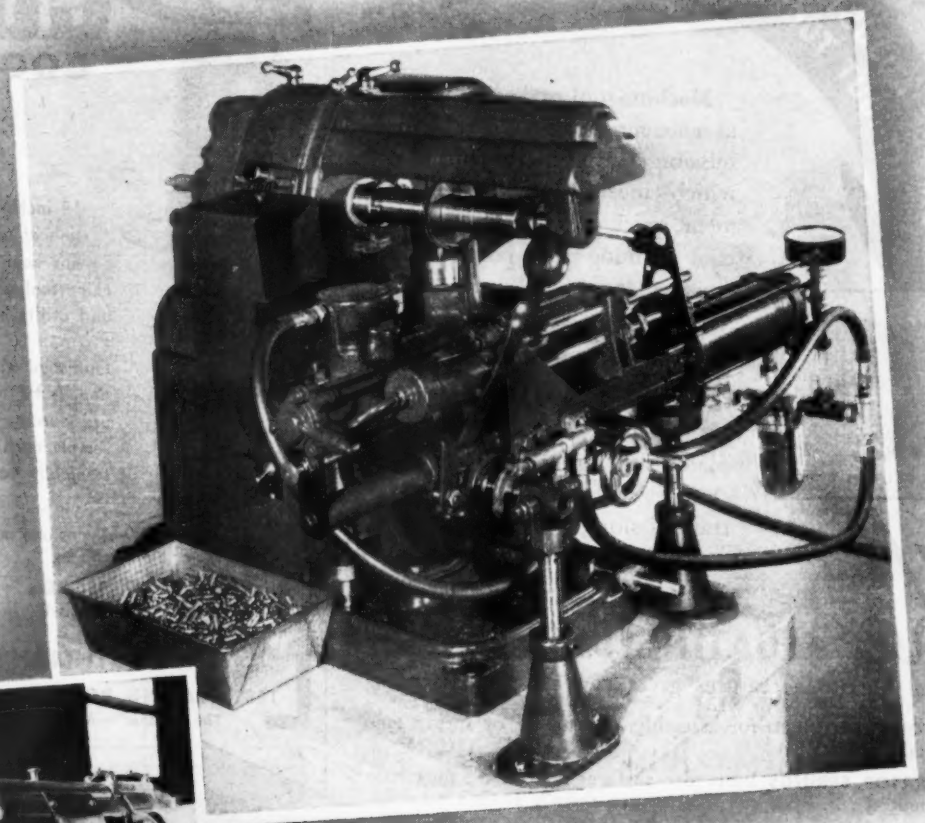
ROLL ON **ABBOTT** *Bearing* **BALLS**

Rely on ABBOTT! Whatever the job you'll find ABBOTT BEARING BALLS contributing to the dependable performance of light, intricate mechanisms and brutal, heavy duty assemblies. Their service record in war and peace proves conclusively that "ABBOTT BEARING BALLS *have* the stamina to carry the load as planned".

UNINTERRUPTED PERFORMANCE
SPECIFY "ABBOTT" and be sure

ROLL ON **ABBOTT** *Bearing* **BALLS**
THE ABBOTT BALL COMPANY HARTFORD 10, CONN. U.S.A.





These two photographs show Atlas milling machines equipped with Redmer air chucks, used for production in the plant of the Redmer Air Devices Corporation, Chicago. The operators hands are freed for loading and unloading, production increased 43%, and scrap eliminated because of the steady grip of the air chuck and constant speed of the air drive.

There's been a lot of talk about imagination in engineering. Vitally helpful in winning the war, it can be equally valuable in winning the production problems of peace.

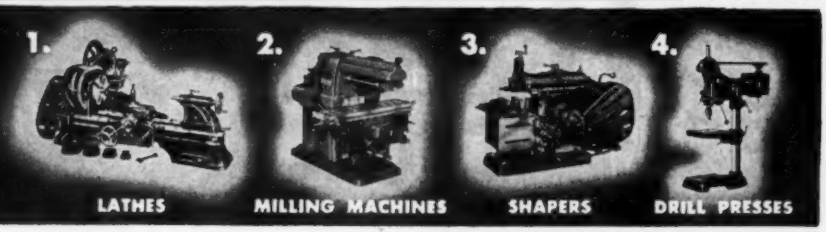
What happens when an ingenious engineer thinks of his particular problems and how they can be solved with compact Atlas tools? The example above begins to tell the story.

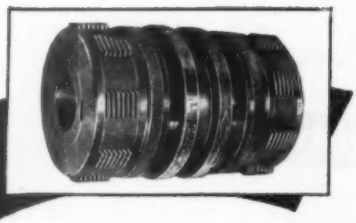
Special Atlas adaptations are found in hundreds of plants. And in practically every case they have made substantial savings in machine tool costs as well as increasing precision production.

Are there similar opportunities for engineering ingenuity in your plant? The latest catalogs will give you the Atlas tool specifications you need.

ATLAS PRESS COMPANY 161 N. Pitcher St., Kalamazoo 13D, Mich.

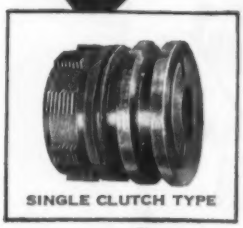
Atlas 4 TOOL TEAM FOR SMALL-PARTS MACHINING





MAXITORQ

SIMPLE ADJUSTMENT WITHOUT TOOLS



SINGLE CLUTCH TYPE

Machine tool operation is only as efficient as the power transmission equipment permits . . . which means smooth engagement, quick power pick-up, quiet cool running and positive disengagement.

Builders of many nationally known machines have adopted the **MAXITORQ** as standard equipment . . . and countless plants are replacing out-moded clutches with this modern power transmission.

Here are the reasons why . . .

The FLOATING DISC CLUTCH

with the Maxitorq features gives you these advantages.

1. **NO TOOLS REQUIRED** for assembly, adjustment of spring tension or take-apart.

2. **SEPARATOR SPRINGS** keep disc surfaces apart . . . they ride free in neutral . . . "you can see between them". There's no drag, abrasion or heat.

3. **DISC SURFACES** are flat and true in exact thickness duplication . . . no low or high spots to interfere with evenly distributed contact when engaged. Thus better performance . . . extended life.

4. **SPRING TENSION** adjustment is simple and quick. Merely turn knurled ring to proper setting . . . lock with notched retaining ring. No tools required.

Both Single and Double clutches in wet and dry types are available in capacities from ¼ to 5 H.P. at 100 R.P.M. Made also in Pulley and Cut-off Coupling types. Investigate now.

THE CARLYLE JOHNSON MACHINE COMPANY

• MANCHESTER, CONNECTICUT •

SEND FOR NEW CATALOG No. 4

MAXITORQ *floating* **DISC CLUTCH**

You can see between the discs

a new **DEEP-IMMERSION GUSHER COOLANT PUMP**

By RUTHMAN

IN TWO LENGTHS

19 inches and 23 inches below the high level line of coolant reservoir. Model HL-15025-B has been produced to meet the need of machine tool requirements for greater tank capacity and utility of floor space.

Furnished with ½ HP motor for continuous duty and ½ HP motor for extra heavy duty, in standard current characteristics. Entire rotating assembly on heavy one-piece ground shaft is *electronically* balanced. Simple installation.

Types and models available for every requirement.

MODEL HL-15025-B

WRITE FOR CATALOGUE

THE RUTHMAN MACHINERY CO.

1809 READING ROAD CINCINNATI 2, OHIO

The "Gusher"—A modern Pump for Modern Machine Tools

Available from Stock

≠ 0-80 and ≠ 1-72

SCREWS and NUTS

Brass or Steel, Cut Thread

Class 3 Fit

Waltham is also equipped to furnish all types of

SPECIAL MACHINE SCREWS and SCREW MACHINE WORK

manufactured to special order.

Write for Catalog and Price List.

WALTHAM SCREW CO.

WALTHAM, MASS.

He's TWICE the Man He Used to Be...

when you start him driving AMERICAN PHILLIPS SCREWS

Take him off the slow, dangerous, *high-cost* drudgery of driving slotted screws. Put him on the trigger-end of a 4-winged Phillips driver and start him driving American Phillips Screws.

He'll do better work . . . because he won't make false starts, or split screw-heads, or slash up his work or himself. *And he'll increase his production as much as 50%* . . . because he won't fumble or drop the screws, or drive them crooked . . . and because he will command the super speed of power driving. Every American Phillips Screw drives straight because the screw and driver *align themselves* into a single unit that can't disengage until the screw-head is turned up tight.

THAT'S WHY AMERICAN PHILLIPS SCREWS COST LEAST TO USE UNDER ANY CONDITIONS . . . NO MATTER HOW FEW ARE USED . . . WHETHER YOUR BUSINESS IS LARGE OR SMALL.

And there are still more reasons why leaders of American industry make American Screw Company their No. 1 source for Phillips Screws. American has had long experience in Phillips production. American maintains adequate nationwide stocks . . . and every screw is American-inspected for fitness of head, thread, and point. NOW see how American Phillips screws can serve as one of *your chief weapons* to fight the costs of the future. Write.

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois Street — *Detroit 2:* 502 Stephenson Building

Take a Recess from Slotted-Screw Costs and Troubles

. . . the Tapered, Engineered Recess of:

AMERICAN PHILLIPS *Screws*

Put the Screws on the Japs . . . BUY BONDS!

For effective Fluid Power Systems

If you have mechanical operations to get done with efficiency and economy, consider Fluid Power.

It is the modern way to transmit power from its source to its job—without shafts, gears, belts or levers.

It moves wherever you want it to go through tubes, and is controlled by valves.

Your Fluid Power system will deliver sure and dependable performance, under all conditions, if it is

Engineered by **PARKER**

PARKER COUPLINGS

are the key to Fluid Power's Vital Link. Engineered and designed by Parker—protected against leakage and vibration—these precision-made fittings have set new standards of reliable performance. Quick to install, quick to service, and meet a wide range of exacting conditions. One of Parker's many contributions to American Industry.

* * *

You'll find it worth-while to talk with a Parker Fluid Power Engineer. Write to The Parker Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio.

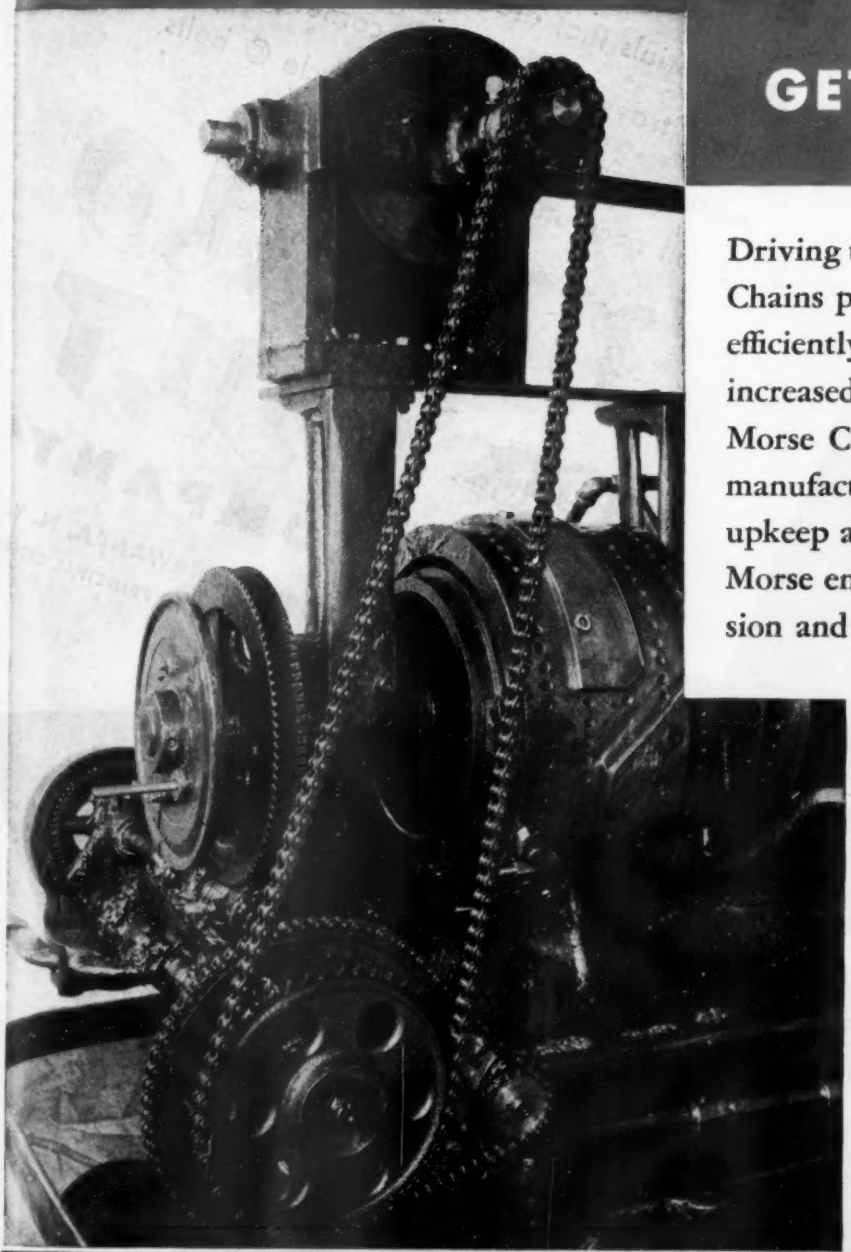
PARKER

APPLIANCE COMPANY

CLEVELAND 12, OHIO LOS ANGELES

FLUID POWER ENGINEERING

It's the Principle . . .
NO SLIP . . .
THAT GETS RESULTS!



Driving through teeth, not tension, Morse Chains prevent slippage, transmit power efficiently and economically. "Production increased 25% with the installation of Morse Chains"—says one machine parts manufacturer. Save substantially in time, upkeep and replacement costs—consult a Morse engineer on *your* power transmission and control problems.

SPROCKETS CHAINS FLEXIBLE COUPLINGS CLUTCHES

MORSE Roller and Silent CHAINS

MORSE CHAIN COMPANY • ITHACA, N.Y. • DETROIT 8, MICH. • A BORG-WARNER INDUSTRY

Putting the screws to the Axis

● Materials that are winning the war are safely traveling to every corner of the earth securely fastened with circle Ⓑ bolts of all sizes and finishes.

BUFFALO BOLT COMPANY

ARMY E NAVY

NORTH TONAWANDA, N. Y.
SALES OFFICES IN PRINCIPAL CITIES

Ⓑ

This battery of Buffalo Bolt vertical threading machines produces thousands of lag screws daily.

Unique Agitation Saves Time and Labor . . . Gives Better Cleaning

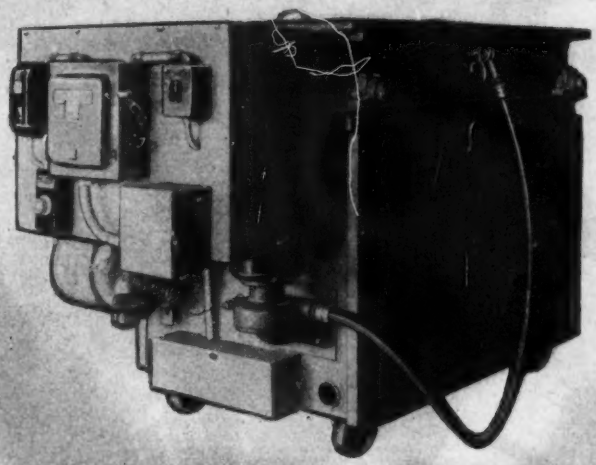
The Magnus All-Purpose Portable Cleaning Machine is based on a unique method of agitation in which the work is repeatedly raised and lowered *in* the cleaning solution, providing an energetic swishing action which insures better cleaning and greatly speeds the cleaning process.

Used with Any Cleaner—alkaline, petroleum spirits, chlorinated solvents or emulsifiable solvent.

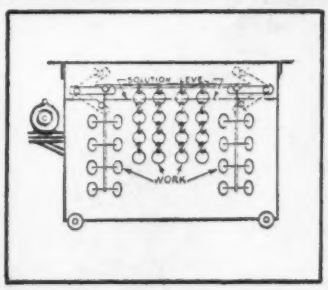
Used on Any Metal—for you can use the cleaner that is safe as well as applicable to the metals being cleaned.

Used on Any Sized Object—since the range of machine sizes available insures a unit to meet your particular needs.

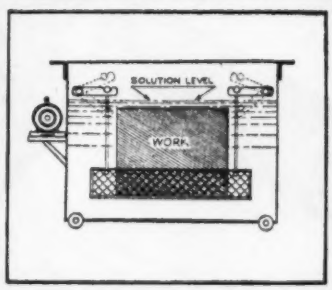
Used for Any Set-up—for precleaning, agitation-soak and/or spraying and combined processes for washing and rinsing.



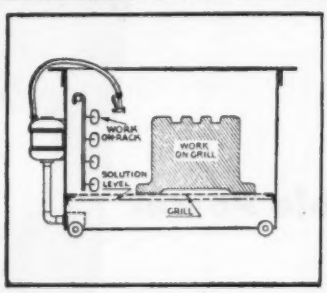
MAGNUS ALL-PURPOSE CLEANING MACHINE



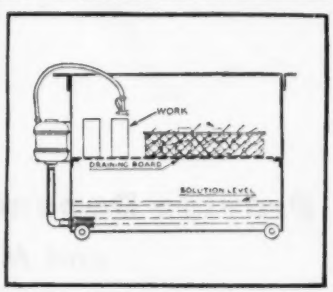
Machine without basket for soaking parts on racks or hooks.



Machine with basket for soaking parts individually or in bulk.



Machine set up for spraying parts on racks or individually.



Machine set-up for spraying parts individually or in bulk on a grille.

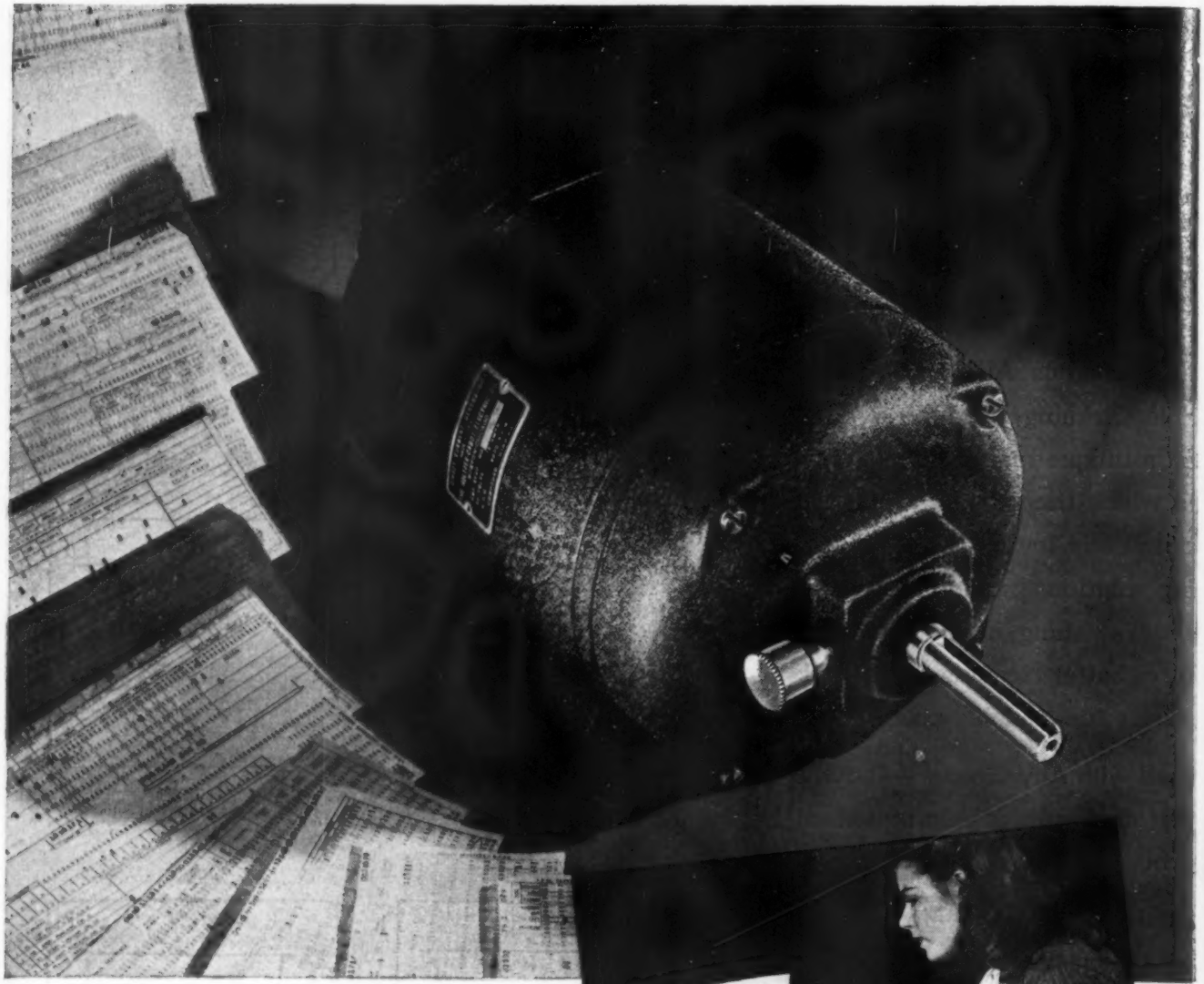
Bulletin 3600 Tells the Complete Story

Write for this description of this unique machine and its applications. Prices range from $300 to $800, depending on capacity and type of heating provided.

Magnus

MAGNUS CHEMICAL COMPANY · 60 SOUTH AVENUE · GARWOOD, N. J.

CLEANERS-METHODS-MACHINES



Provide Dependable Power
and Meet
Mechanical Design Specifications

The problem of a well-known manufacturer of business machines was to obtain a motor and a generator that not only provided the correct power to operate extremely sensitive solenoids but also fit the space which was at a premium. Holtzer-Cabot motor development engineers tackled the job and designed a special motor and generator with the proper performance characteristics in special frames which fitted the space specifications . . . and another motor problem was solved.

For over 50 years Holtzer-Cabot has concentrated its energies in designing and building special motors.

Holtzer-Cabot Powered Tabulating Machine

And although today, our plant facilities are devoted entirely to manufacturing special fractional H. P. motors for war products, our development engineers will gladly cooperate with you on your post-war fractional H. P. motor requirements.

Special Motors Designed to Fit the Application

HOLTZER-CABOT

Division of First Industrial Corporation

Designers and Builders of Special Fractional HP Motors and Electrical Apparatus

125 AMORY STREET, BOSTON 19, MASSACHUSETTS • CHICAGO, ILL. • NEW YORK, N. Y. • PHILADELPHIA, PENNSYLVANIA

ALLEN-BRADLEY

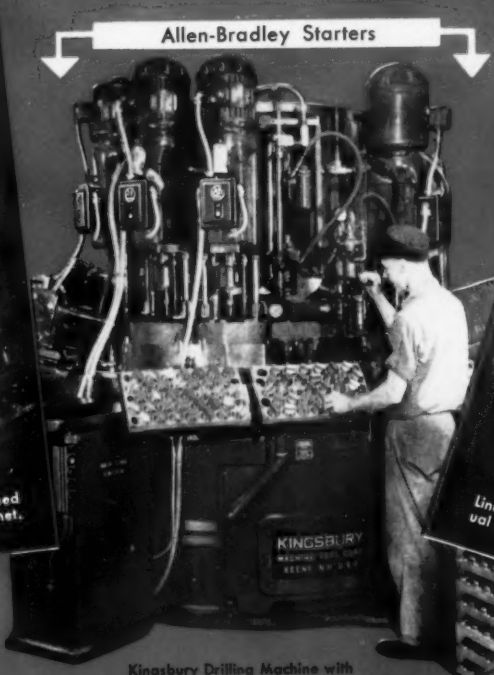
MOTOR CONTROLS FOR PRODUCTION LINES

QUALITY

18 A-B STARTERS ON CENTRIFUGAL CASTER

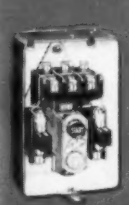
Turntable Unit with 18 centrifugal spinners each with an A-B Bulletin 712 Combination Starter.

Fin Milling Cutters in large automotive plant equipped with A-B control panels mounted in steel safety cabinet.



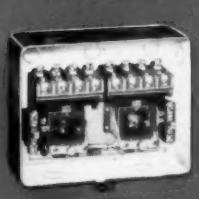
Kingsbury Drilling Machine with several A-B manual and automatic motor starters.

Line-up of Lincoln Welders each equipped with individual A-B Bulletin 609 manual across-the-line starter.

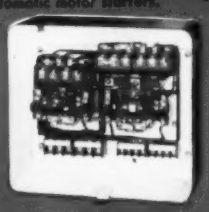


Manual Starter

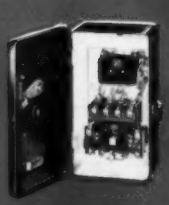
Automatic Starter



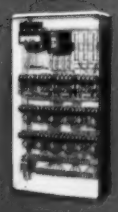
Reversing Switch



Multispeed Starter

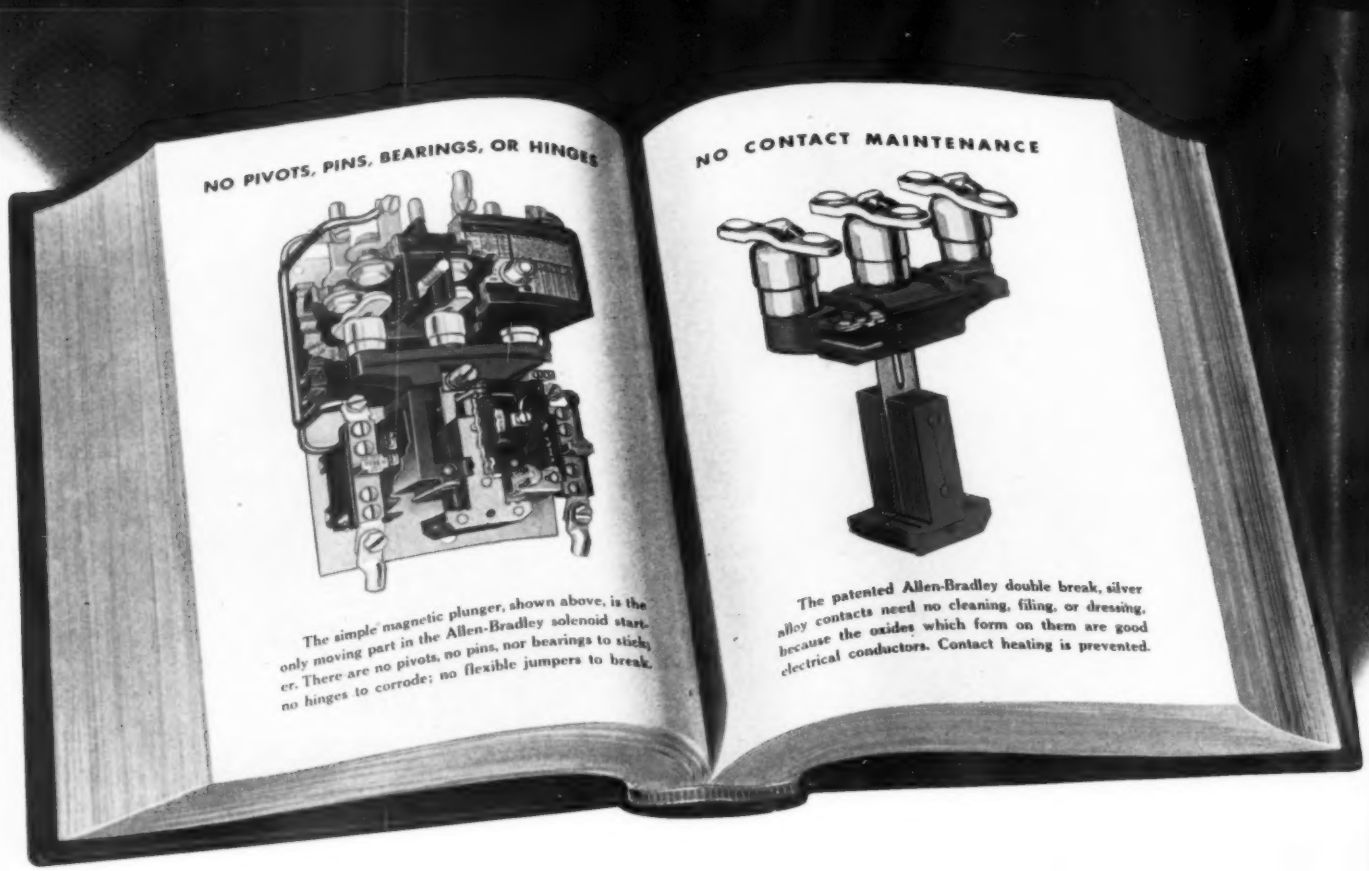


Combination Starter



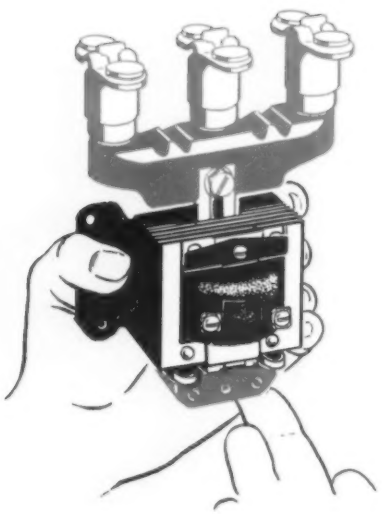
Machine Tool Control Panel

THERE IS AN ALLEN-BRADLEY STARTER TO FIT EVERY INDUSTRIAL APPLICATION


NO PIVOTS, PINS, BEARINGS, OR HINGES
The simple magnetic plunger, shown above, is the only moving part in the Allen-Bradley solenoid starter. There are no pivots, no pins, nor bearings to stick; no hinges to corrode; no flexible jumpers to break.
NO CONTACT MAINTENANCE
The patented Allen-Bradley double break, silver alloy contacts need no cleaning, filing, or dressing, because the oxides which form on them are good electrical conductors. Contact heating is prevented.

The Amazing Success Story of Allen-Bradley Solenoid Starters can be told in 4 words:

"Only one moving part"



The double break, movable contacts of the A-B solenoid starter are mounted on an insulated cross-bar which is attached to the simple magnetic plunger.

Every engineer knows... and every maintenance man agrees... that the greatest simplicity in design is the best assurance of trouble-free starter operation. Less parts mean less trouble.

Therefore, when a motor starting switch... like the Allen-Bradley solenoid starter... has *only one moving part,* it is not only the SIMPLEST but also the most trouble-free starter on the market.

The widespread preference of machinery builders for Allen-Bradley solenoid controls accounts for the dominant position of the Allen-Bradley line in recent market surveys. Machinery builders understand the value of a simple design, especially in severe service... so they specify Allen-Bradley solenoid control.

Allen-Bradley Company, 1316 S. Second St., Milwaukee 4, Wis.

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

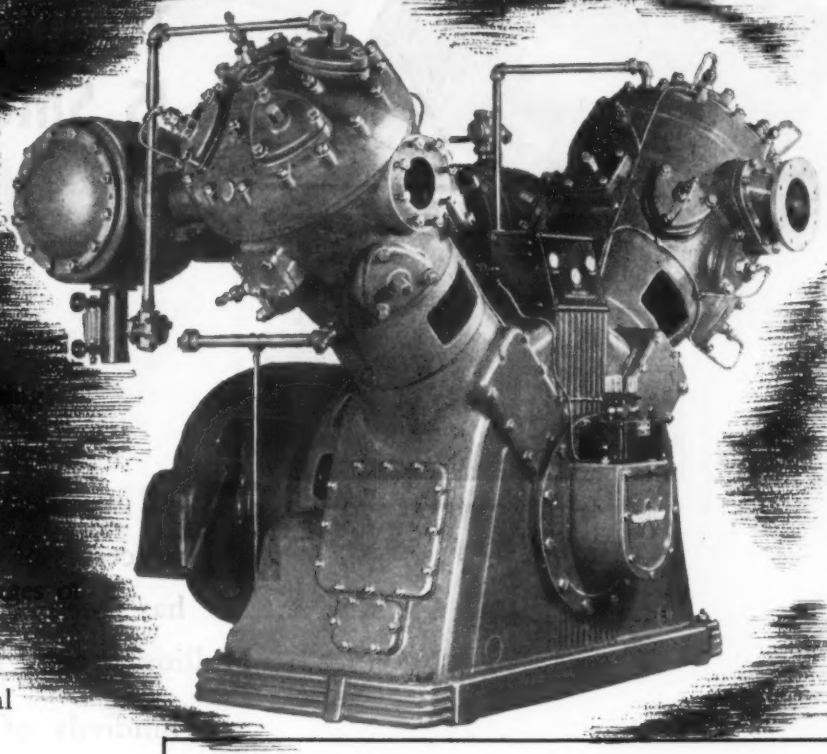
TWO-FISTED PACKAGE OF AIR POWER

This Worthington Huskie Comes All Ready for Quick Installation

★ **Automatic alignment [illegible] engineer necessary**

★ **No elaborate founda[illegible]**

★ **75% less founda[illegible] horizontals of the [illegible]**



Worthington's new YC "packa[illegible] air compressor needs no time-co[illegible] reception committee. Saves tim[illegible] engineers and installation crew[illegible] valuable man-hours!

In addition, you get four big advan[illegible] "two-fisted" Y-design.

1. Higher speeds with balanced vertical Y-frame.

2. Safer installation even where subsoil under foundation is poor.

3. Accessibility of parts for quicker, easier periodic inspections, with large handy openings, outside valves and full-floating metallic packing easily reached.

4. Adaptable to many drives. Flanged type, synchronous or induction motors, directly mounted on compressor shaft. Easily arranged for Multi-V-Drive or for coupled drive from explosion-proof motor or practically any type of rotative power.

A WORTHINGTON EXTRA

New line of Worthington bearings and connecting rods requiring no attention whatever . . . except oil.

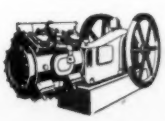
Write for complete details. Bulletin L-667-B1. *Worthington Pump and Machinery Corporation, Compressor Division, Buffalo, N. Y.*

WORTH BEHIND THE NAME
WORTHINGTON

AC4-14

NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON

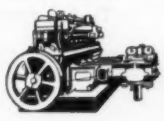
Y-Type


Horizontal

Vertical

Radial

Portable


Gas Engine Compressors

The ROAD TO MASS PRODUCTION IS SMOOTHED ··· with Mullins impressions

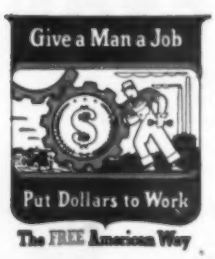
THE pathway of the mass production processes of many an American Industry has been smoothed and widened by Mullins' Pressed Metal Designs.

Hundreds of today's streamlined, light but sturdy, low cost devices have benefited by Mullins' design engineering experience and mass production facilities.

A Mullins' Press Engineer is always ready to add his know-how to yours in designing your future products. 'Phone or write for him.

Manufacturers of Youngstown Kitchens by Mullins

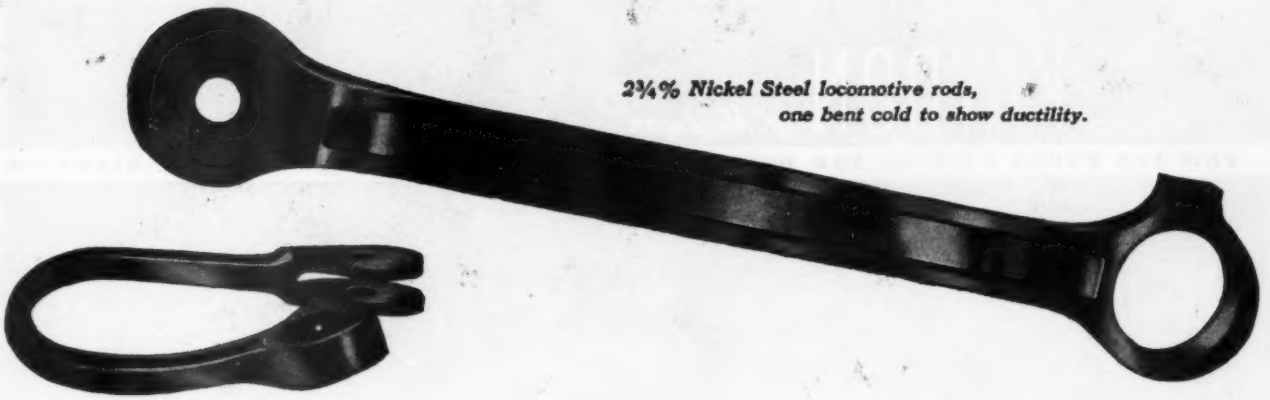
Until the last shot is fired — buy bonds — give blood — salvage fats and paper — work for Victory. Then do your part to . . .



DESIGN ENGINEERING SERVICE
LARGE PRESSED METAL PARTS
PORCELAIN ENAMEL PRODUCTS

Mullins MANUFACTURING CORPORATION
SALEM and WARREN, OHIO

Mullins can PRESS it from METAL instead.



2¾% Nickel Steel locomotive rods, one bent cold to show ductility.

QUENCHED AND TEMPERED NICKEL STEEL FORGINGS COMBINE

EXCEPTIONAL DUCTILITY WITH HIGH TENSILE STRENGTH

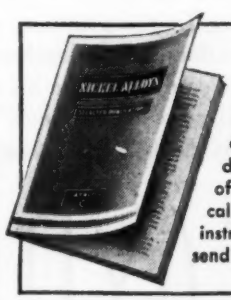
Composition and Typical Properties of Normalized Quenched and Tempered 2¾% Nickel Steel Rods

Description or Size	Melt Yield Pt. No. #s per Sq. In.	Tensile Strength #s per Sq. In.	Elong. % in 2 In.	Reduction in Area %	ANALYSIS					
					Car.	Mang.	Phos.	Sul.	Sil.	Ni
Main Rod....	92900	110000	25.0	64.4	.31	.78	.027	.026	.25	2.75
Main Rod....	86500	104500	25.5	65.6	.32	.86	.034	.032	.29	2.69
Main Rod....	86360	104400	26.0	64.8	.32	.86	.034	.032	.29	2.69
Main Rod....	87850	102350	26.0	66.2	.31	.89	.037	.025	.32	2.69
Front Rod....	86000	102250	25.0	67.3	.29	.82	.035	.027	.24	2.71
Front Rod....	83900	104250	25.0	66.1	.29	.82	.035	.027	.24	2.71
Front Rod....	86850	104250	27.0	66.1	.32	.86	.035	.025	.30	2.65
Front Rod....	89500	107050	25.5	65.6	.32	.86	.035	.025	.30	2.65
Back Rod....	89500	107650	25.0	62.7	.30	.79	.030	.025	.22	2.71
Back Rod....	87500	106450	25.0	65.4	.29	.82	.035	.027	.24	2.71
Back Rod....	87000	105600	25.0	65.4	.29	.82	.035	.027	.24	2.71
Back Rod....	88150	104850	26.0	66.8	.29	.82	.035	.027	.24	2.71

Specimens Taken from Mid-Section of Prolongations of the Forgings

The above table compiled by the American Locomotive Company shows the chemical compositions and mechanical properties of some normalized, quenched and tempered nickel steel front, main and back rods recently produced as replacement rods for locomotives being speeded up and rebalanced. These values are typical of replacement rod forgings recently tested by that company.

Quenched and tempered nickel steel forgings provide high tensile strength and ductility, combined with unusual toughness and high fatigue strength—qualities which tend to obviate breakage and assure long, trouble-free service when employed in heavy duty machinery and equipment.



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★ Nickel ★

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall Street, New York 5, N. Y.*

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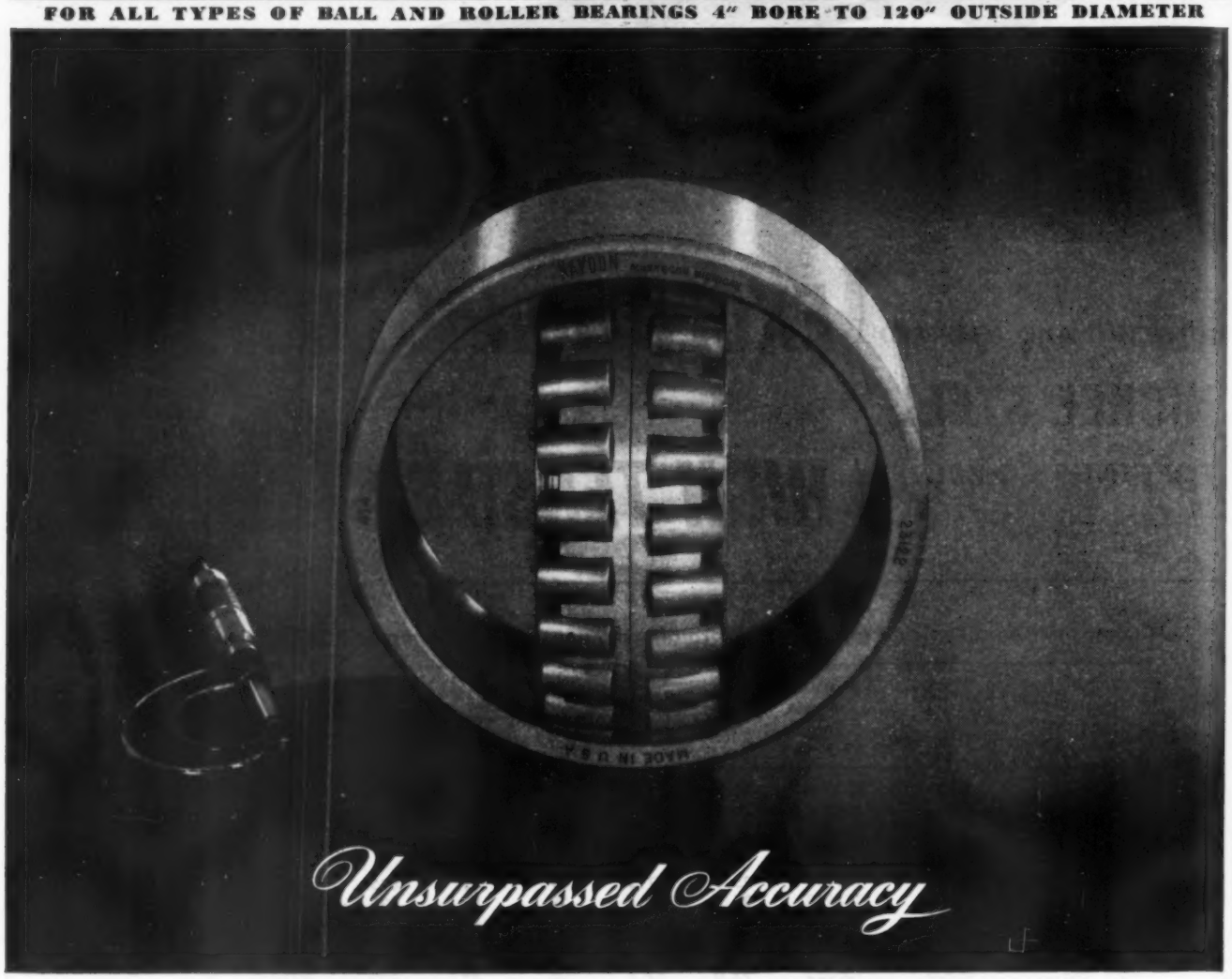
FOR ALL TYPES OF BALL AND ROLLER BEARINGS 4" BORE TO 120" OUTSIDE DIAMETER



Typical of KAYDON precision is the spherical roller bearing, 4.3307" I. D. x 7.0866" O. D. x 2.2047" wide illustrated above. KAYDON Bronze or steel retainers; super-precision or standard tolerances.

PROPORTIONATE to a tolerance of .0001" on a 6" diameter — that is the extreme precision with which KAYDON produces ball and roller bearings in diameters up to 120". Few attempt such difficult accuracy.

KAYDON, *specializing* in the production of all types and sizes of bearings, offers an outstanding service that banishes the need for compromising on a "standard" bearing that cannot fill your exact needs.

Atmospheric control in heat treating, rarely provided by special bearing manufacturers, is available at KAYDON. In addition, KAYDON offers added services in flame hardening, precision heat-treating, metallurgical laboratories, microscopy and physical testing.

Counsel in confidence with KAYDON. While vital wartime requirements have precedence, capacity for general production is constantly increasing. Look ahead — and plan ahead — with KAYDON!

KAYDON *Types of Standard or Special Bearings:*

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Ball Radial • Ball Thrust
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MUSKEGON • MICHIGAN

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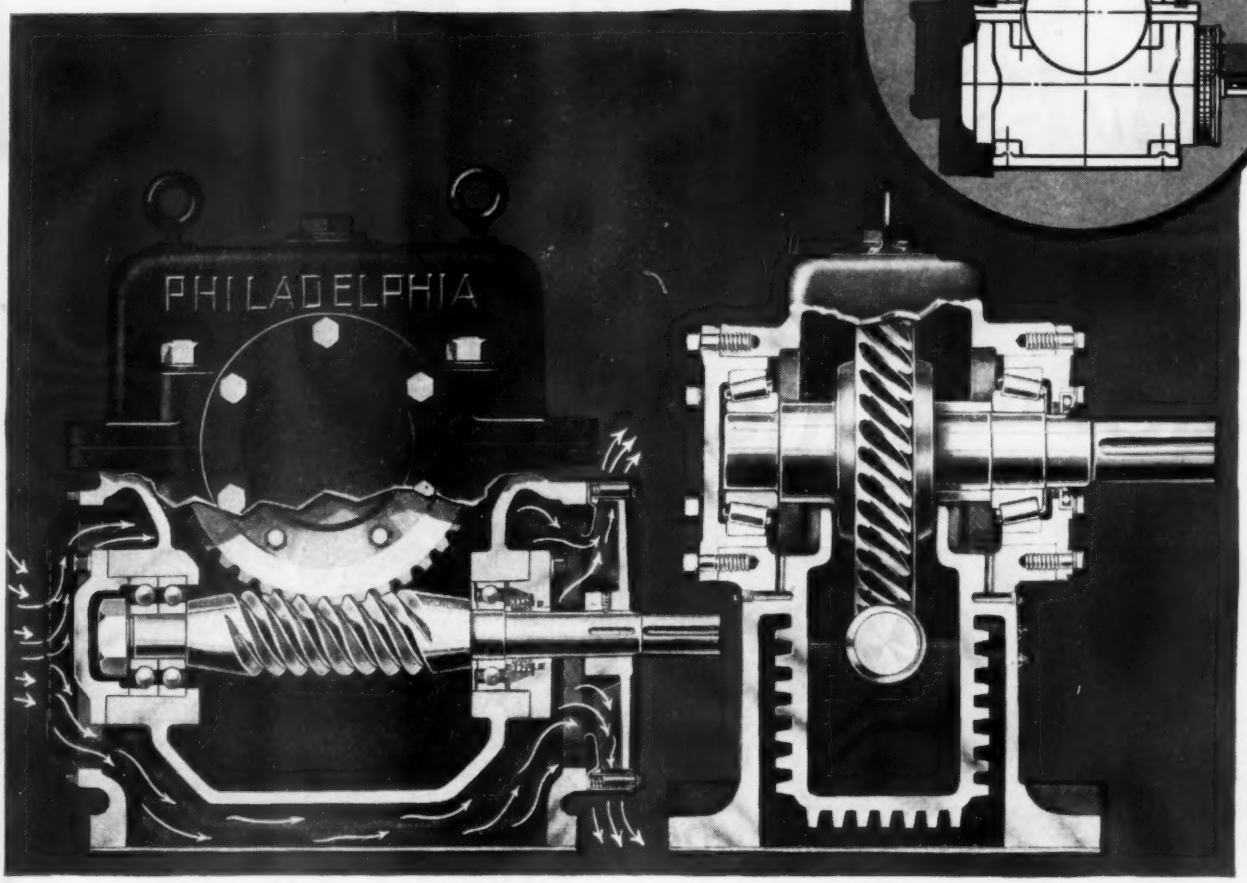
Get Greater Load Capacity in a Smaller Housing



...with the Philadelphia AIR KOOLED Worm Gear Speed Reducer

At the upper right is shown the comparative sizes of a size 675 Type AT standard unit (in blue) and a size 475 AirKooled unit. Both deliver 20 HP at 1750 RPM. Ratio 4 6/7 to 1.

The cut-away drawings show the double-walled, finned housing and the flow of air around the oil reservoir.

Considerable *space* and *weight* savings have been made possible by the design of Philadelphia AirKooled Worm Gear Reducers as compared with standard heavy duty type worm gear units.

The AirKooled design features a suction fan, mounted on the worm shaft, which draws air through the double-walled, finned housing. This dissipates generated heat, and thereby maintains a higher contact oil film strength and greatly increases the horsepower ratings at worm speeds of 580 and 1750 RPM. For all ratios at 1750 RPM the ratings are approximately doubled, so the AirKooled unit is about two sizes smaller than a standard unit of the same capacity.

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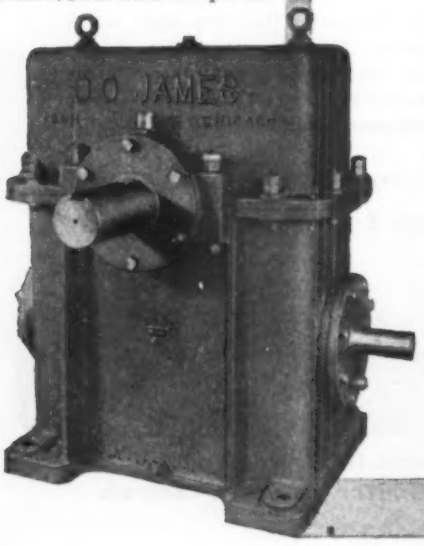

Due to their wide ratio range, the D. O. James Worm Gear Reducers are ideal for many power saving installations. They are designed and built by an organization that has had over a half century of Gear Making Experience and who have successfully pioneered the Gear Reducer to its present high efficiency standards. The many and repeated installations of D. O. James Worm Gear Speed Reducers testify to their superiority and adaptability. These reducers are the result of excelling craftsmanship in our engineering, cutting, grinding, assembling, inspection and testing departments. Their efficiency is further increased in the usage of the best and most suitable materials. An experienced supervision and modern plant facilities assure a finished product that will be successful in "The Doing of The Job."

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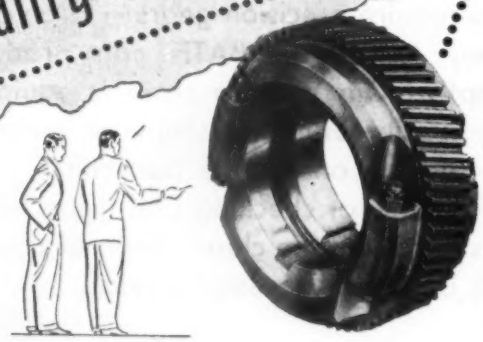

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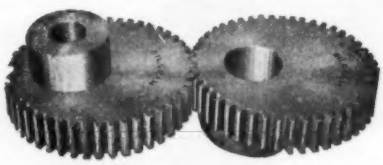

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Gears as large as this giant or as small as you wish—produced individually or on a production basis.

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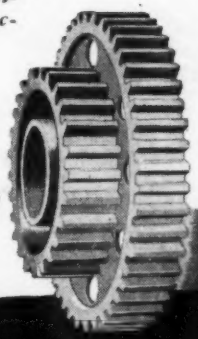

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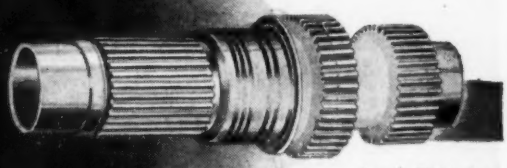
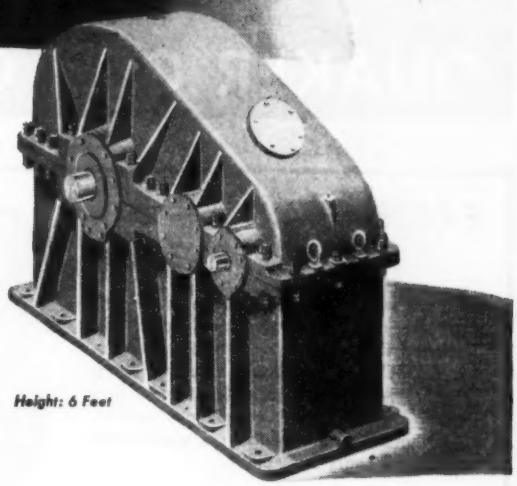


Length: 10½ Inches



Height: 6 Feet

You may require a giant spur gear to turn a cement kiln. Your production may demand gears of aircraft quality produced by the thousands. You may operate a paper mill—a steel mill—a chemical plant—where your needs for speed reducers vary from midgets, so small you can lift them with one hand, to giants weighing tons. Or, perhaps, you build aircraft engines where advances in gear engineering and newly developed production techniques have made possible the mass manufacture of gears that closely approach engineering perfection.

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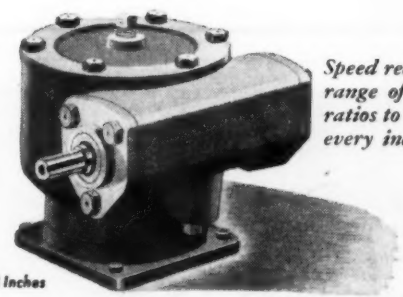
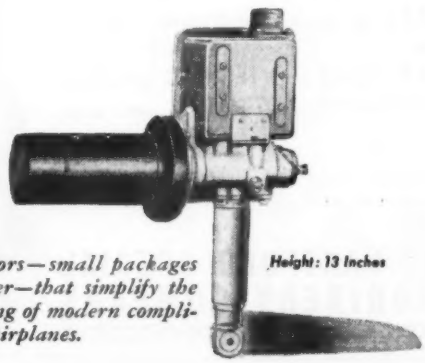


Speed reducers in a wide range of sizes and gear ratios to meet practically every industrial need.

Height: 5 Inches



Actuators—small packages of power—that simplify the handling of modern complicated airplanes.

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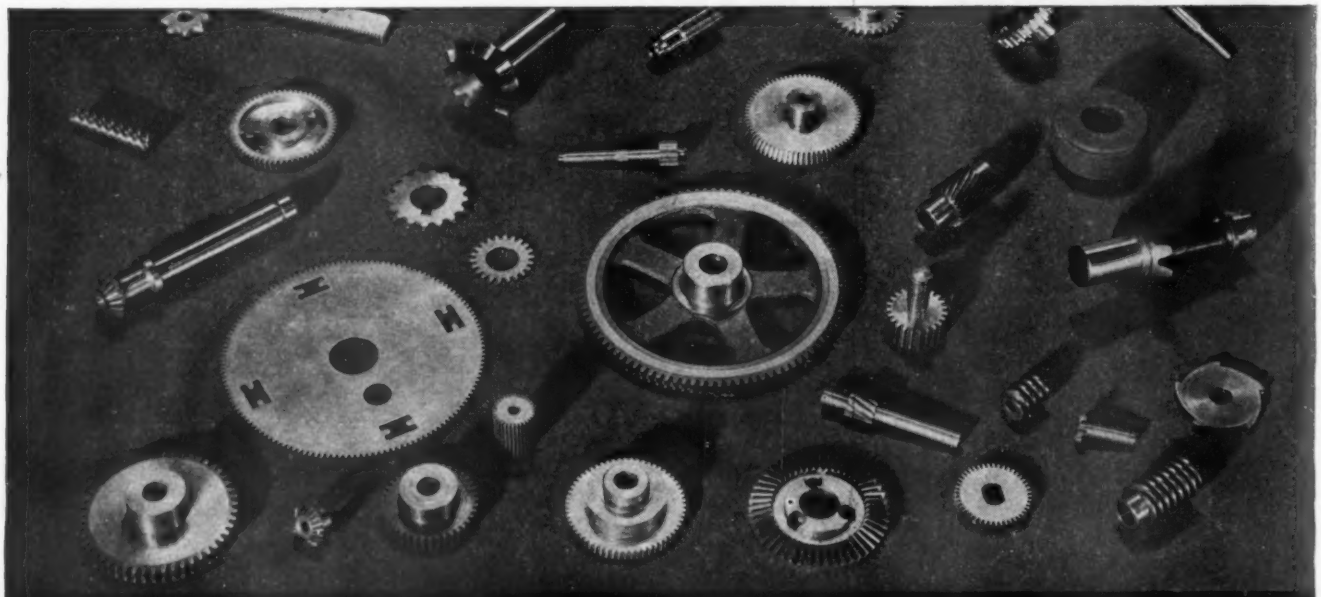

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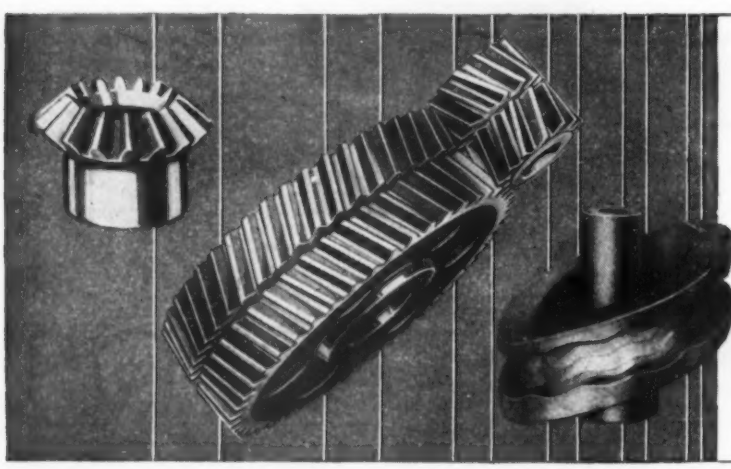

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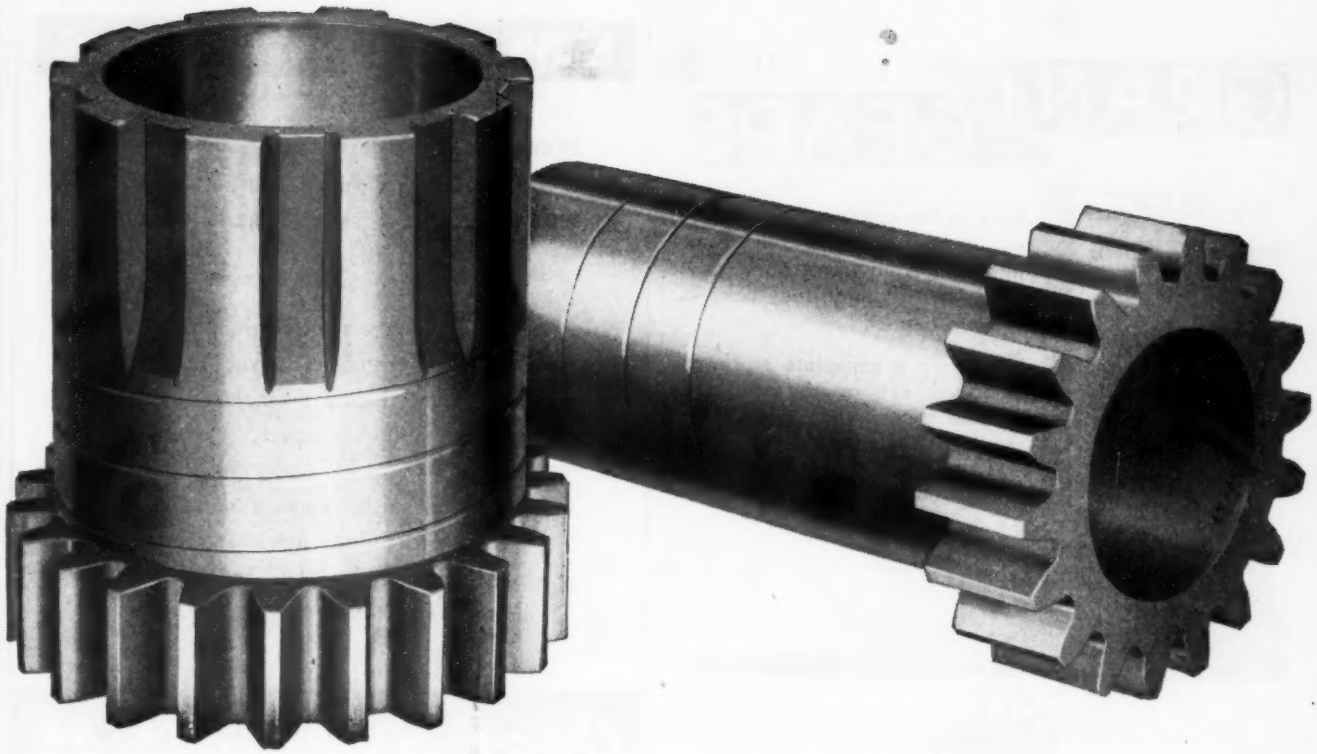

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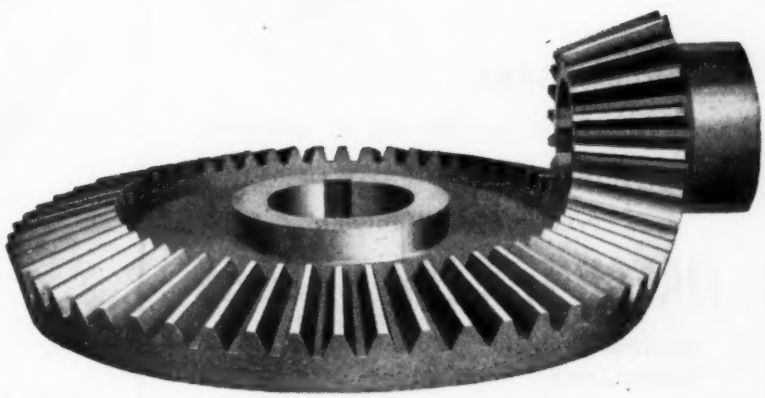

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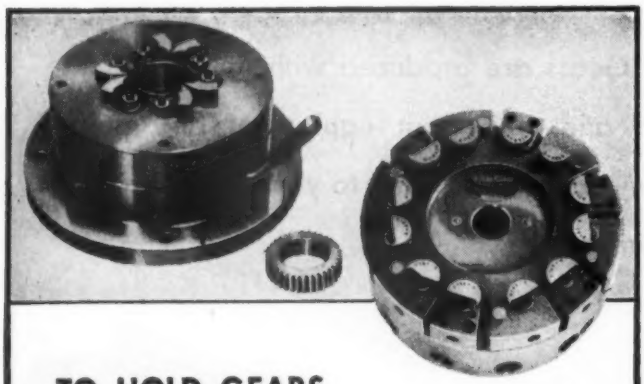

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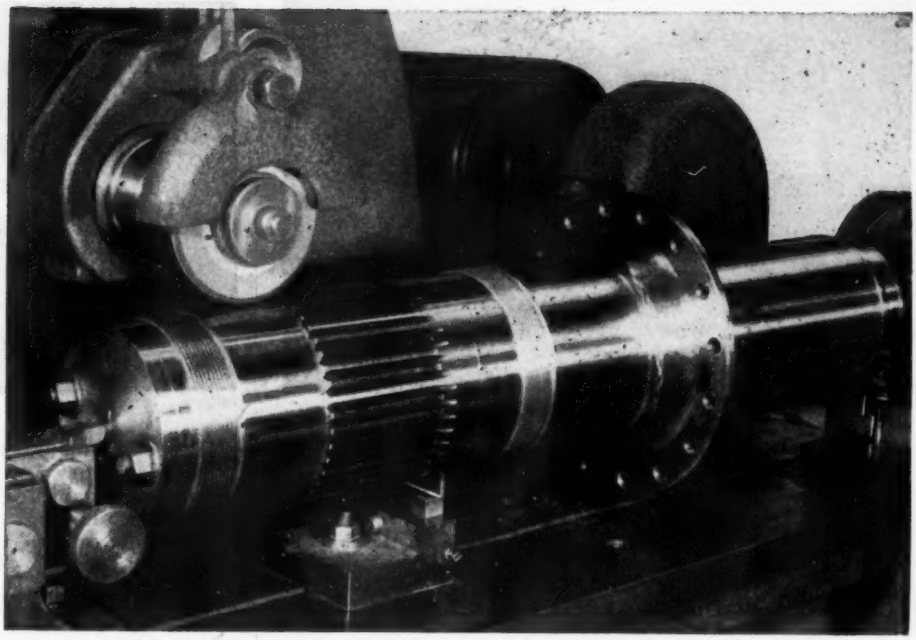

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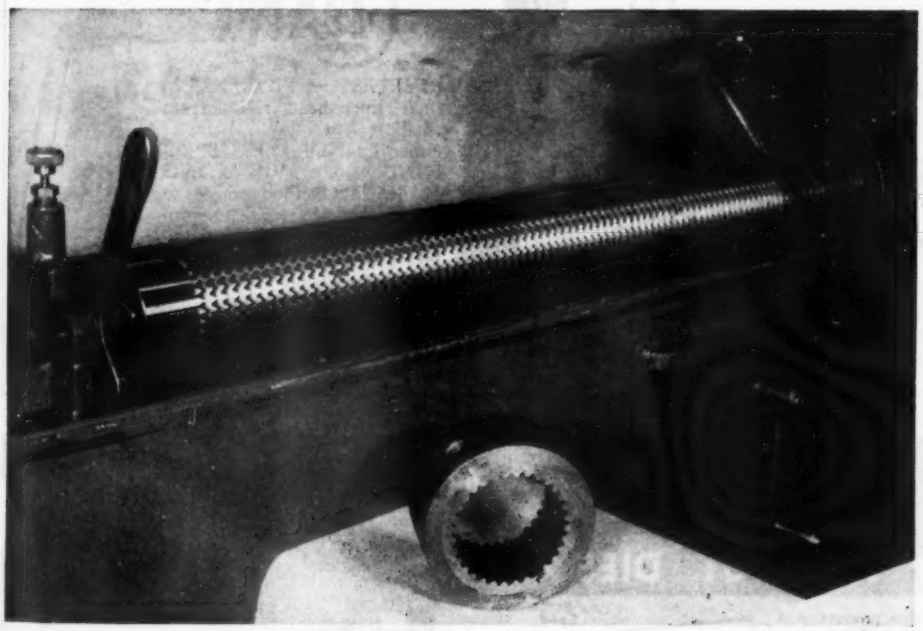

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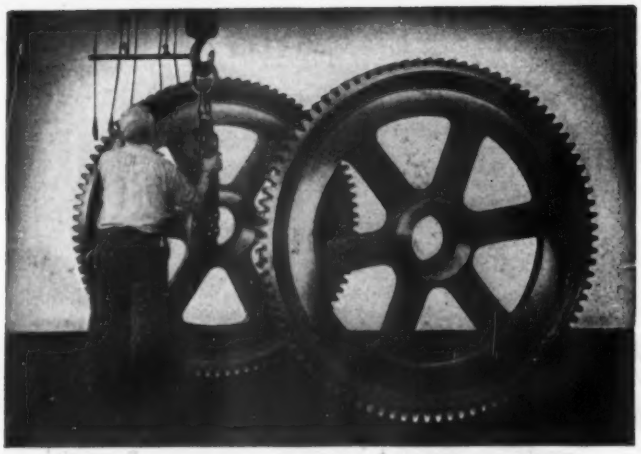

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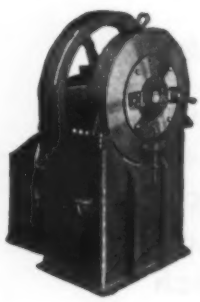

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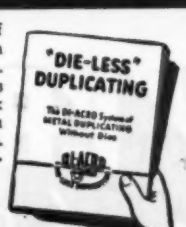

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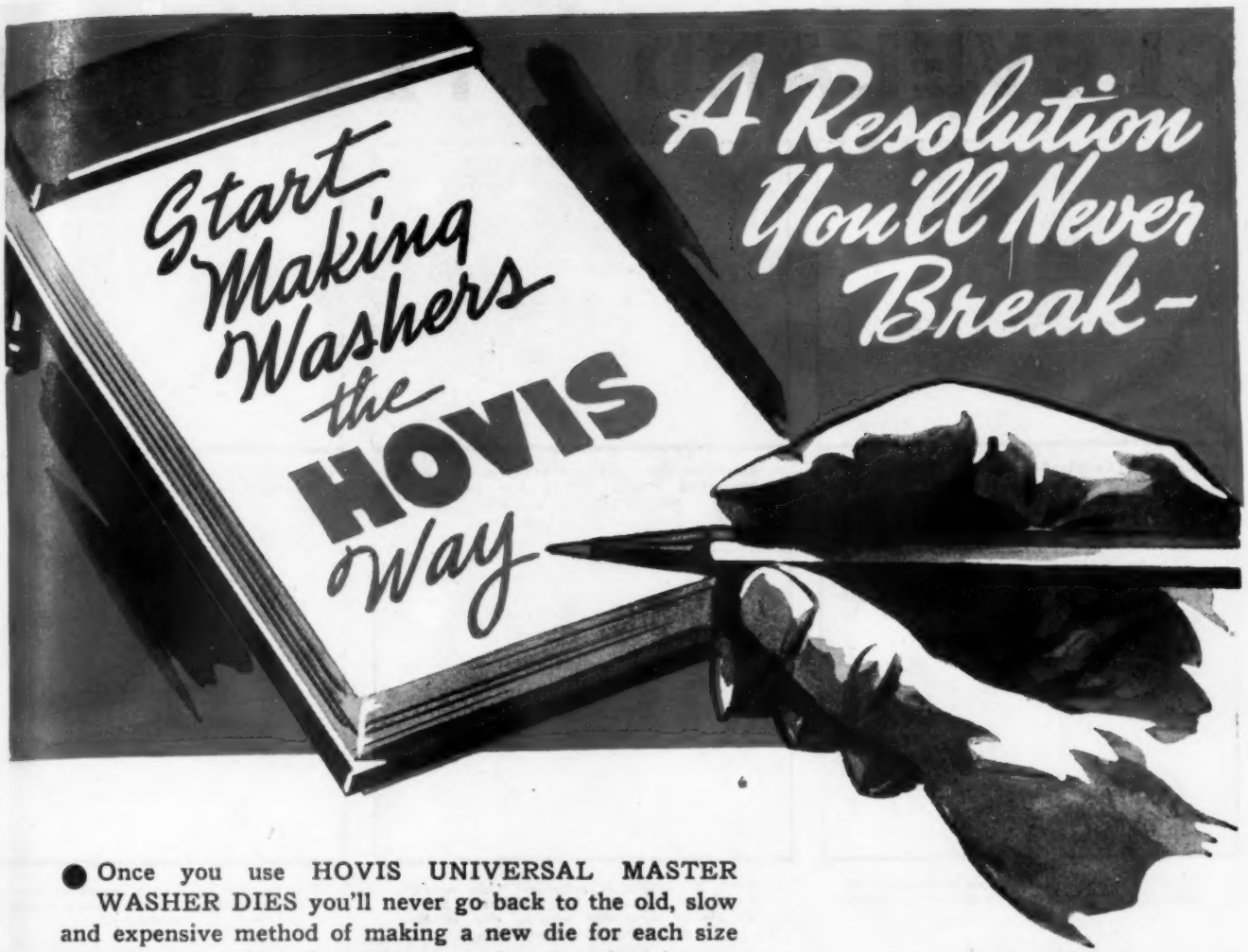

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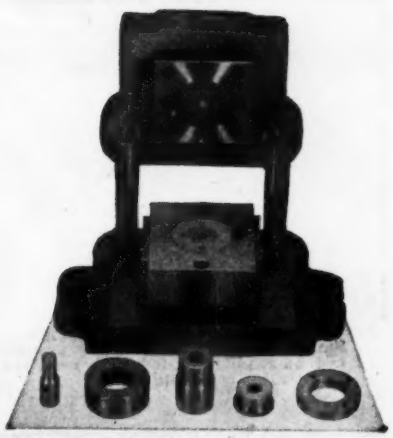

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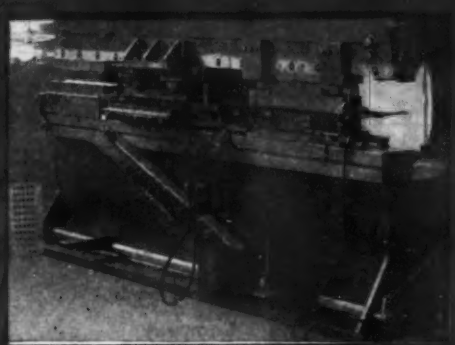

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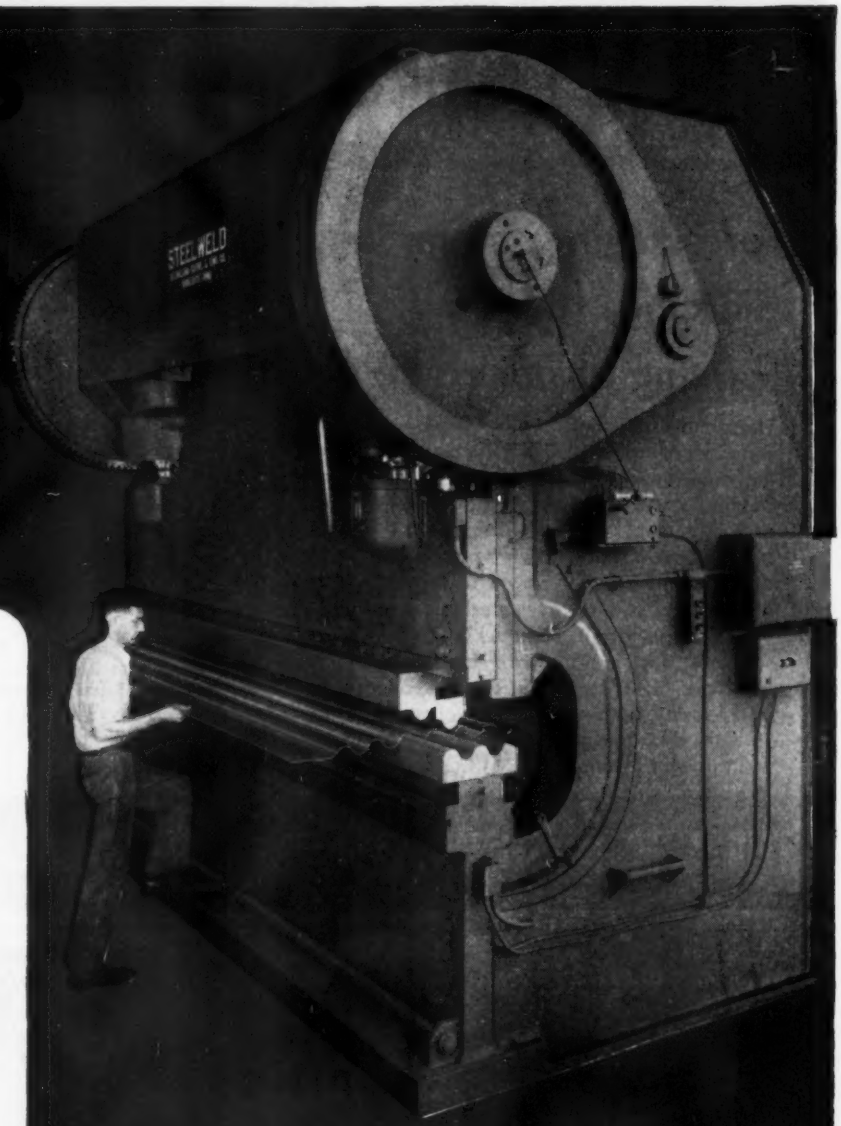


For anyone working with metal — steel, aluminum, dural, monel, stainless steel, etc.— in any thickness up to one inch and lengths to 20 feet, Cleveland Steelwelds offer important advantages — advantages that can have direct bearing on the future success of a department or entire business.

They make possible easy fabrication of parts that by ordinary methods would be difficult and expensive. They speed production and lower costs because press work is fast. After easily-inserted dies are setup, parts may be formed as quickly as they can be placed into or removed from a press.

Cleveland Steelwelds are versatile. Any of the various operations illustrated at left are easily performed on any machine.

Hundreds of Cleveland Steelwelds are serving leading concerns in the United States and many foreign countries.

A FEW OF MANY FEATURES

1. All-welded one-piece steel frame with box-type end housings and heavy steel throat forgings.
2. Extra deep throat—18" standard. May be up to 36" for some models.
3. Six exceptionally large main bearings.
4. Clutch and brake easily adjusted without tools.
5. Smooth velvet-touch control. Ram stops with extremely little drift.

THE CLEVELAND CRANE & ENGINEERING CO.

CLEVELAND

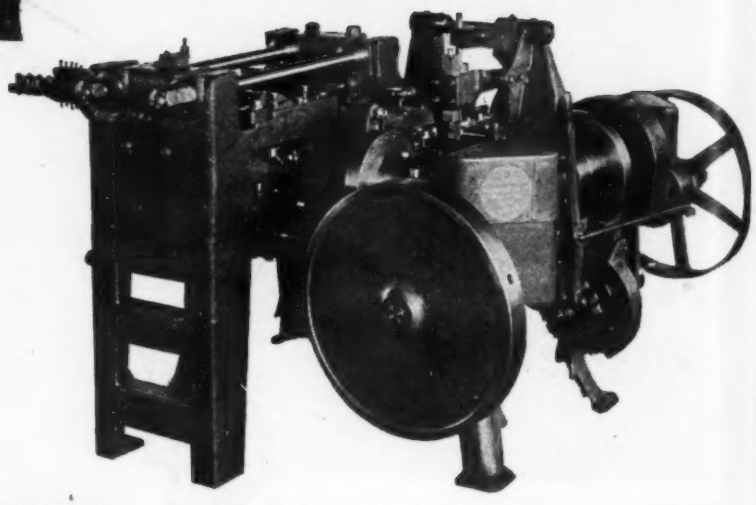
STEELWELD PRESSES

GENERAL SALES AGENTS: THE CYRIL BATH CO., E. 70TH & MACHINERY AVE., CLEVELAND

The New NILSON AUTOMATIC PRESS and FOUR SLIDE MACHINES

for swaging, stamping, piercing, blanking, forming of coiled metal

These new machines built in two models—for general purpose, heavy duty fabricating metal forming—provides a capacity far beyond what is practical to accomplish with ordinary cam motion. The new NILSON is a combination power press and four slide machine with powerful silent action of main press slide operated by crank motion through toggle or knuckle joints. Great strength and rigidity are inherent in this machine. Die sets are readily accessible and easily removable. No obstruction to view is offered and tools can be adjusted without interference.



These machines are built in 2 sizes—for forming from 3/16" and ¼" diameter wire and for flat material 2" and 2½" wide. Send for 4-page bulletin giving complete details.

As specialists in the design and construction of special automatic machinery of all kinds, we are in position to render a complete service on this class of work. Consult Nilson on your special requirements.

THE A. H. NILSON MACHINE CO... Bridgeport, Conn., U.S.A.

DANLY DIE SPRINGS

MEDIUM PRESSURE HIGH DEFLECTION
HIGH PRESSURE MEDIUM DEFLECTION

DANLY MACHINE SPECIALTIES, INC.
2100 South 52nd Avenue • Chicago 50, Illinois

Milwaukee..111 E. Wisconsin
Detroit....1549 Temple Ave.
Cleveland..1550 E. 33rd St.
Dayton....990 E. Monument
Rochester..16 Commercial St.
Philadelphia.3858 Pulaski Av.
Long Island City 47-28 37th St.
Ducommun Metals & Supply
48905 Alameda, Los Angeles

PRESSES
FEEDS
AUTOMATIC EQUIPMENT
The V & O Press Company, Incorporated
HUDSON, NEW YORK

BAUMBACH
STANDARDIZED DIE SETS

BETTER-MADE
DIE SETS
AT LOWER COST
46 Styles—195,000 Sizes
E. A. BAUMBACH MFG. CO.
Machined Steel Semi-Steel
Send for our new catalog
1812 South Kilbourn Ave., Chicago, Ill.

STRAIGHT SIDE SINGLE CRANK PRESSES
for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economically on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

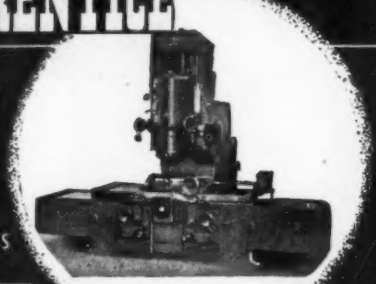
Full details on request.

straight side press

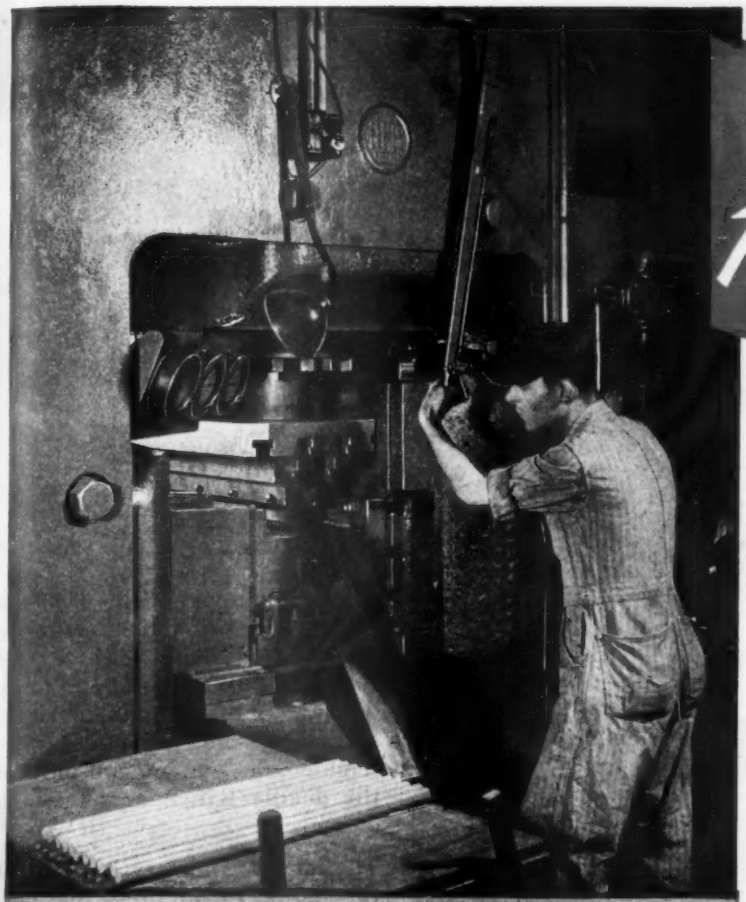
ZEH & HAHNEMANN CO.
180 Vanderpool Street
NEWARK N. J.

REED-PRENTICE

LATHES
JIG BORERS
DIE SINKERS
DIE CASTERS
VERTICAL MILLERS
INJECTION MOLDERS



REED-PRENTICE CORP
WORCESTER TOOLS MASS U.S.A.



PHOTOGRAPHED AT FANSTEEL METALLURGICAL CORPORATION

Making a bar from powdered tungsten on the Elmes hydraulic press. After sintering, these bars are swaged to round and down to size, or rolled into the desired shape. Powdered metal also can be pressed into intricate "finished" forms.

PRESSING *Powdered Metal*

FOR IMPLEMENTS OF WAR..AND OF PEACE

The world will hear a lot about Powder Metallurgy in the days that lie ahead, for by this unique production method, metals which will not naturally alloy in the proportions desired—if at all—can be mixed in powder form and then made into strong, solid shapes by pressing and sintering.

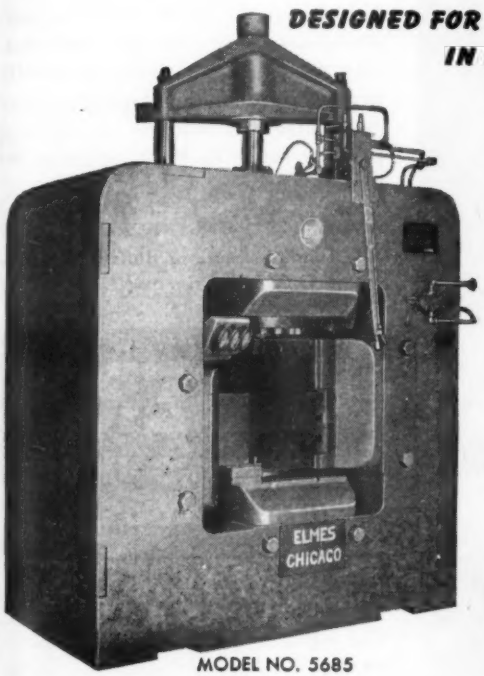
At the Fansteel Metallurgical Corporation of North Chicago, pure powdered metal, much finer than flour and with a melting point so high that no satisfactory crucible has yet been developed to hold it, is weighed out in exact amount and placed in the mold of a 1000-ton Elmes hydraulic press. Several hundred tons pressure then is applied to form this powder into a fragile bar, given strength by subsequent sintering (heating).

Such a pressing operation calls for the right type of equipment as well as sensitive control, for pressure must be both properly applied and accurately regulated if the necessary uniformity in section is to be obtained. In tungsten, for example, six grades differing only in physical structure are made, including the recent Fansteel development for industry, tungsten rod electrodes for atomic hydrogen welding.

With replacement of only a few simple line-gaskets, the Elmes powdered metal press at Fansteel has delivered three years of dependable double-shift performance in the production of tantalum, tungsten, molybdenum and columbium—rare metals that serve America in war as in peace.

Put your pressing problems up to Elmes. Suggestions, recommendations, and cost estimates reflect nearly a century of progress in building and applying hydraulic equipment. Elmes Engineering Works of American Steel Foundries, 1001-1013 Fulton St., Chicago 7. Also manufactured in Canada.

DESIGNED FOR UNIFORM DENSITY IN COMPACTED SHAPE



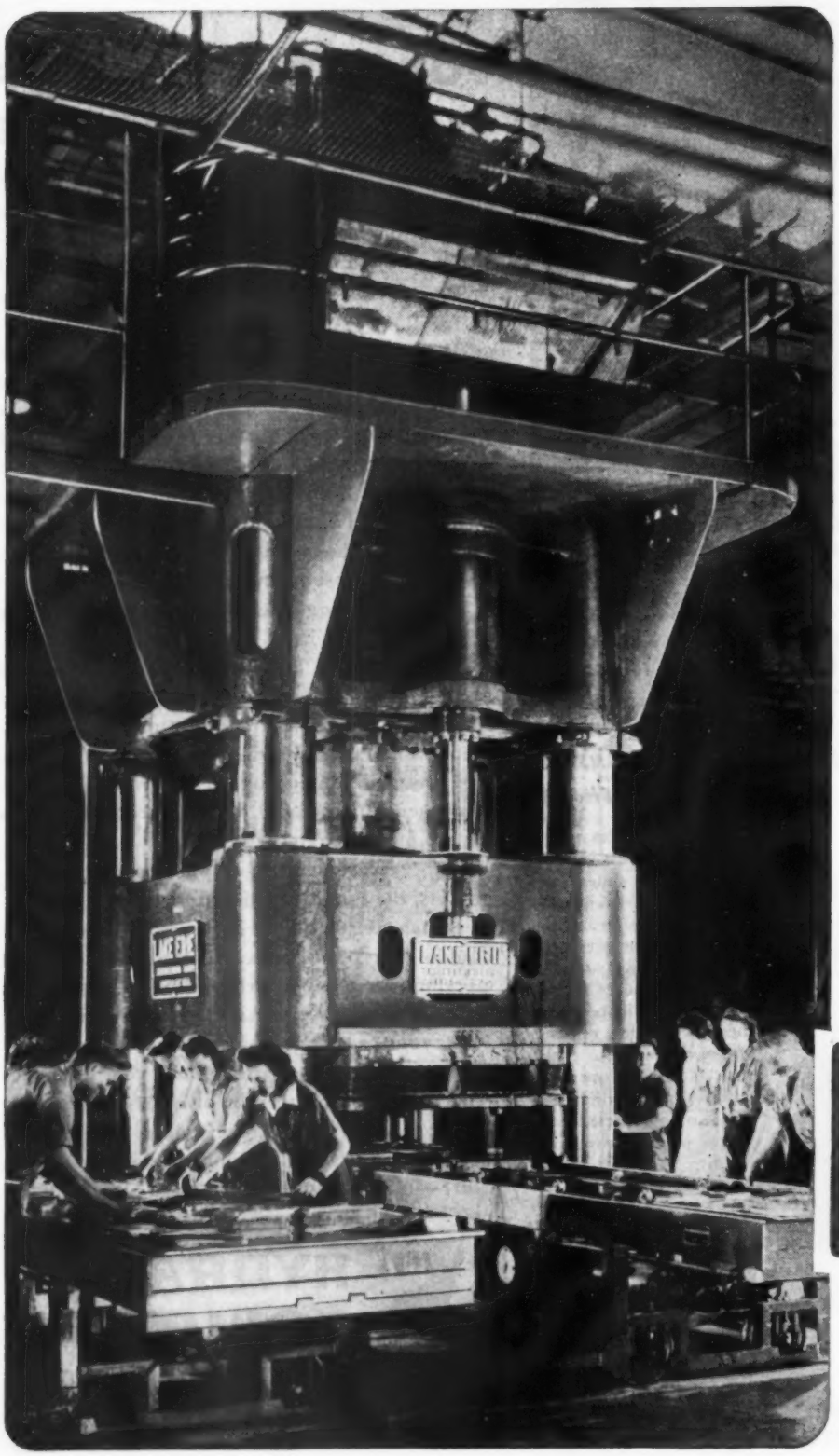
MODEL NO. 5685

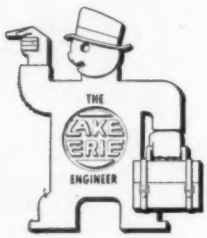
This is the Elmes powdered metal press used at Fansteel. Two slides, one above the work and the other below, can each exert a 1000-ton pressure, simultaneously. Hydraulic equalizing assures a definite travel ratio between these two slides, regardless of resistance or pressure. Mold sides open hydraulically to facilitate removal of compacted bar. Elmes presses combine rigidity with fast, accurate performance.

ELMES HYDRAULIC EQUIPMENT

METAL-WORKING PRESSES · PLASTIC-MOLDING PRESSES · EXTRUSION PRESSES · PUMPS · ACCUMULATORS · VALVES · ACCESSORIES

BELL KINGCOBRAS "CANNON ON WINGS" start here





One stamping from this 5000-ton Lake Erie Hydraulic Press, one of several specially built for the Bell Aircraft Corporation, fabricates many of the smaller Alclad sections, which, when finally assembled, become integral parts of the deadly Kingcobra, "cannon on wings."

The aircraft industry knows that the "power of the press" has contributed greatly to today's speedy yet economical aircraft production.

Lake Erie engineers and craftsmen—having designed and built presses for eighty percent of American aircraft manufacturers—are in an able position to apply their knowledge to your reconversion problems. Write us for information regarding standard hydraulic presses that can be adapted to your production methods—or special presses built to your specific requirements.

LAKE ERIE ENGINEERING CORP.
507 Kenmore Station, Buffalo 17, N. Y.
Offices in Principal Cities

LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

The following bulletins will be sent on request: 144—Lake Erie Hydraulic presses column type; 244—Lake Erie Hydraulic Presses side housing type.

NOW YOU'RE TALKING MASONITE* DIE STOCK'S LANGUAGE!

ONE of the most remarkable things about Masonite Die Stock is the great speed with which it can be fabricated in pattern or metal shop.

This is mighty important in these reconversion days when the managements of many industries want to get back into normal production. They are finding Masonite Die Stock ideally suited for quick, efficient, economical change-over.

Remember, this amazing material is only one-sixth the weight of steel—handles with ease—yet has great compressive and flexural strength.

Available in thicknesses of ¼ to 2 inches . . . in sizes of 48 x 72 inches and 48 x 144 inches. For complete details about this modern die stock, please fill out and mail the coupon.

PRODUCTION PIN-UPS. Look for the next issue of "Production Pin-ups" on your plant bulletin board. They give you pictures and explanations of the latest uses of Masonite Die Stock.

*"Masonite" is a trade-mark registered in the U. S. Pat. Off., and signifies that Masonite Corporation is the source of the product.

Masonite BRAND DIE STOCK

MASONITE CORPORATION, *Dept. AM-1,* 111 W. Washington St., Chicago 2, Ill.

Please send me illustrative literature and complete information about Masonite Die Stock.

Name and firm _____

Address _____

City _____ *State* _____

COPYRIGHT 1945, MASONITE CORP.

IF YOU ARE LOOKING FOR A WAY TO SPEED TUBE CUTOFF JOBS

Check on this

This ETNA Tube Cutoff Machine is being used to cut off cold drawn steel tubes—a job that under normal circumstances would require machining, BUT NOT HERE. The ETNA Tube Cutoff Machine eliminates the need for machining by producing perfectly squared ends, accurate to the thousandth of an inch. The cut ends are equally as smooth as a machined job and the result is accomplished in a fraction of the time.

If your operations involve cutting off of tubing or sleeves there is no doubt that the ETNA Tube Cutoff Machine will speed production and save time and money. Listed below are just a few of the many important advantages these units offer. Check them over and then write for more information. We'll be glad to send complete operation, design and construction data on the ETNA Tube Cutoff Machinery.

- Tubes need not be straightened before cutting because the tube is held stationary while being cut.
- Cutoff cycle is completely automatic. Tube is clamped, cut off and unclamped by pushing one button. Obviously no experience is required to operate the machine.
- Machine is one-package unit—just connect three wires and start using it.
- Completely hydraulic operated fingertip control gives infinite range of feeding rates. Adjustable A. C. motor offers infinite speed range. A turn of a dial for complete range of feeds and speeds.
- As can be seen in the above illustration all moving parts are enclosed, thus there is absolutely no operator hazard.

ETNA Tube Cutoff Machines are available in capacities to cut off tube ranging from ½" O.D., ⅛" Wall, up to 12" O.D., ½" Wall. Machines to handle tube of over 5" O.D., ½" Wall can be built to your order.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING

Ask ETNA about Swaging

The ETNA Machine Company

3400 MAPLEWOOD AVENUE

TOLEDO 10, OHIO

A MYSTERY MEETS ITS MASTER

Laborious, time-consuming calculations slowed the progress of science and industry until Sir John Napier found the key to the mystery. In like manner, complex, time-consuming manual operations handicapped many large scale production schedules until Clearing Presses made new techniques possible.

The engineer's slide rule is a direct descendant of Napier's logarithms. Modern low cost production of large units from bath tubs to sedan bodies is descended from a new conception of the purpose and possibilities of the press as a tool; that conception was Clearing's.

As ever-lower costs become increasingly important, you may find it helpful to consult Clearing about your production problems. Maybe there's a new and better way to eliminate difficult, slow or costly operations in your plant. At any rate, it will be worth your while to investigate.

CLEARING MACHINE CORPORATION
6499 West 65th Street, Chicago 38, Illinois

CLEARING
MECHANICAL AND HYDRAULIC PRESSES
for such operations as
DRAWING · BLANKING · FORMING · FORGING

CMC CLEARING

1. "Replaces expensive machines"

2. "Replaces experienced workers"

3. "Sturdily built"

4. "Wide application"

5. "Maintains accuracy"

6. "Up-keep very light"

OSTER

Those advantages of the Oster No. 601 "RAPIDUCTION" Lathe were mentioned by the manufacturer who purchased the machines illustrated above and numerous others in the same plant.

More than two years ago, this manufacturer faced a serious shortage of skilled machine operators. Oster No. 601 Lathes were purchased. The town was "combed" for workers who came with little or no prior experience. Rapid training was made possible by the SIMPLIFIED construction and operation of the Oster No. 601 Lathe. Contract specifications demanded high standards of accuracy. Around-the-clock schedules were in effect within a few weeks.

That's a sample of many similar cases where Oster No. 601 "RAPIDUCTION" Lathes were called into action on war production. But the advantages of these SIMPLIFIED machines will not stop with the war. Diversified industries will use Oster "RAPIDUCTIONS" on a wide scope of applications.

Equipped with either WORM DRIVE or DIRECT DRIVE and with either automatically indexing six-station turret or with plain saddle and single tool post, the Oster No. 601 "RAPIDUCTION" is furnished to meet individual needs at low cost.

"Rapiduction" LATHES

THE OSTER MANUFACTURING COMPANY • 2049 EAST 61ST STREET, CLEVELAND 3, OHIO, U. S. A.

ELIMINATE WHEEL FORMING

SAVE TIME AND MATERIALS

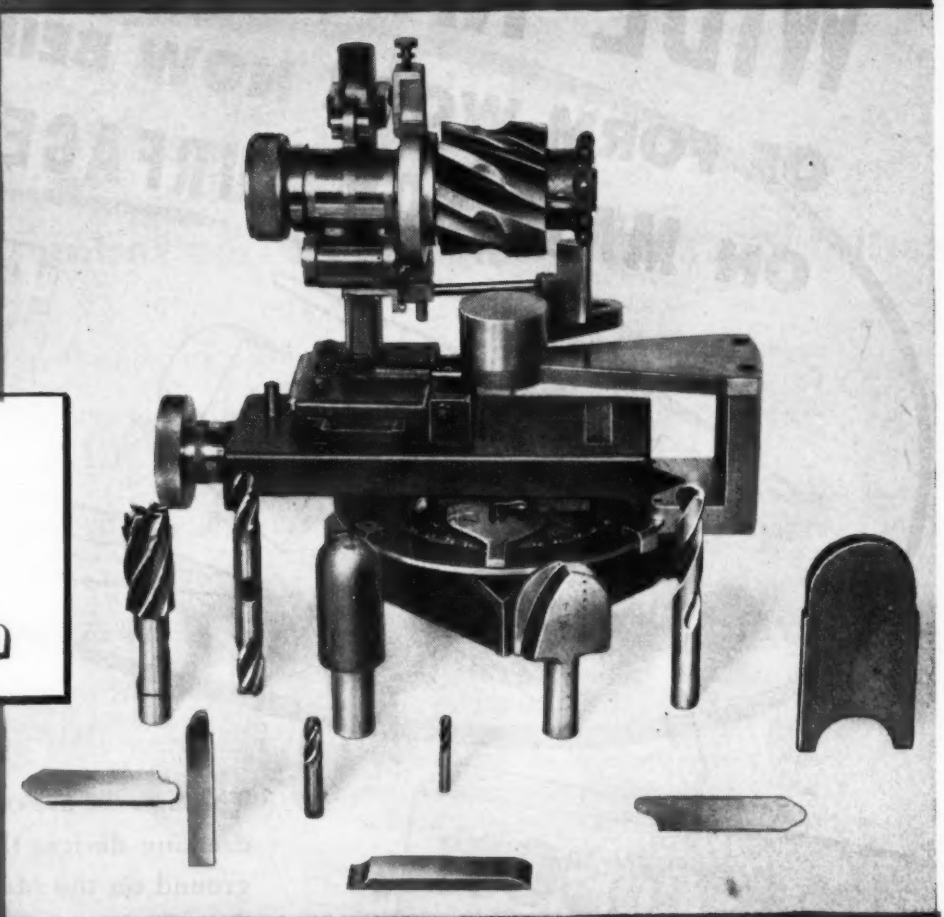
★

SPEED PRODUCTION

MEYERS

Radiform

TRADE MARK REG.



Meyers Radiform set up to generate a radius on a helical slab mill. Also pictured are a few standard cutting tools which have been made into "specials", on the Radiform.

PAT. PENDING

GENERATES CUTTING TOOLS TO ACCURATE TOLERANCES

The Meyers Radiform is unlike any other machine on the market in that it is adaptable to so many different grinding operations. Predetermined radii can be *accurately* generated on tool bits, milling cutters, end mills, drills and die sinking tools in less time than by any other method.

Speed, accuracy and *versatility*—a combination that makes the Radiform indispensable in any shop. Discover what Radiform can do for your shop. Write or wire today for complete descriptive literature and prices.

W. F. MEYERS COMPANY, INC. • *Established 1888*
1022 FOURTEENTH STREET • BEDFORD, INDIANA

Clip
AND MAIL THIS COUPON TODAY!

W. F. MEYERS COMPANY
1022 Fourteenth Street, Bedford, Indiana
Please send catalog and price list on Meyers Radiform Wheel and Tool Former.

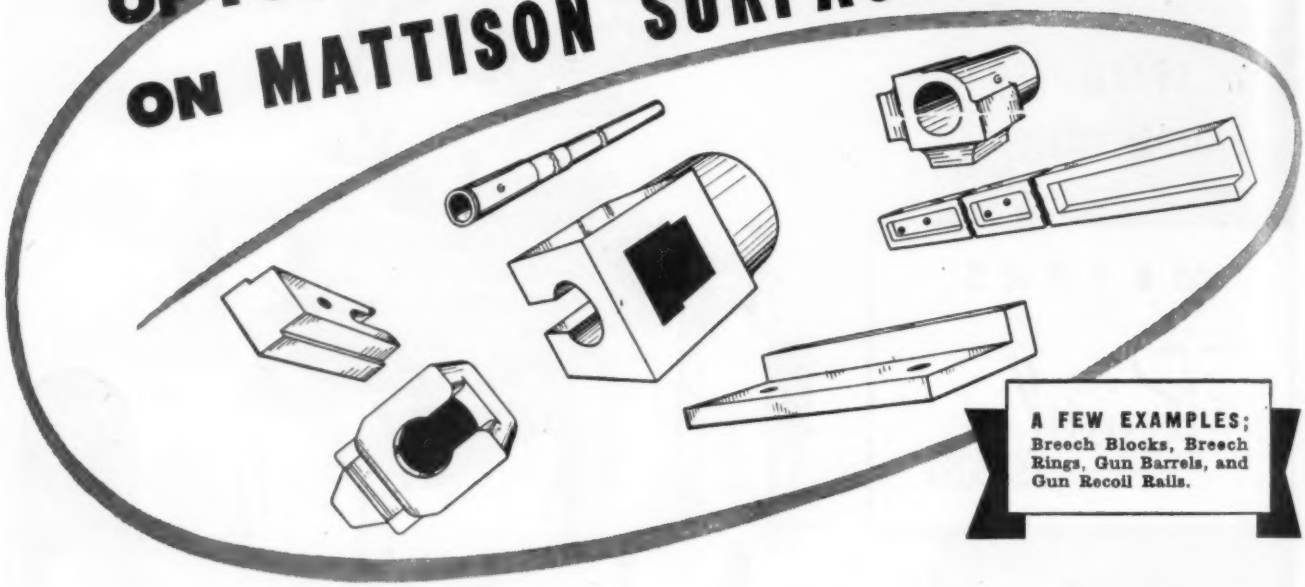
Company _____

Address _____

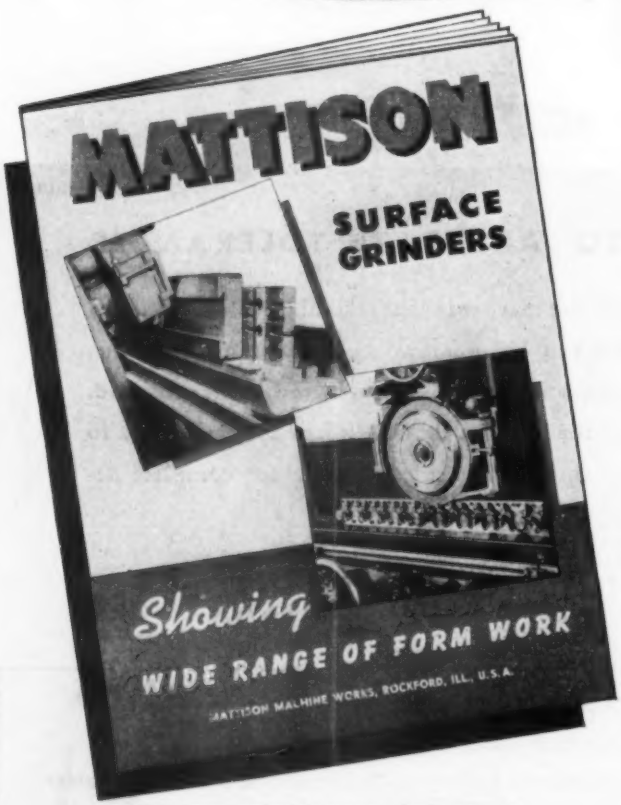
Name _____ Title _____

WIDE RANGE

OF FORM WORK NOW BEING GROUND ON MATTISON SURFACE GRINDERS



A FEW EXAMPLES;
Breech Blocks, Breech Rings, Gun Barrels, and Gun Recoil Rails.



Through the use of special fixtures and contour dressing devices the above parts are all being ground on the Mattison High-Powered Precision Surface Grinder with a great saving of time and to extremely close limits of accuracy. These applications are important, not only from the standpoint of present production needs, but because they illustrate the unlimited capacity of Mattison Grinders over and above regular flat grinding. To you it opens up a new opportunity for grinding, a new opportunity for saving and a new opportunity for increasing production on work previously thought impossible to grind.

Ask for new free book, showing these and other unusual jobs ground by means of special fixtures and dressing devices on the Mattison Grinder.

Send for this NEW BOOK

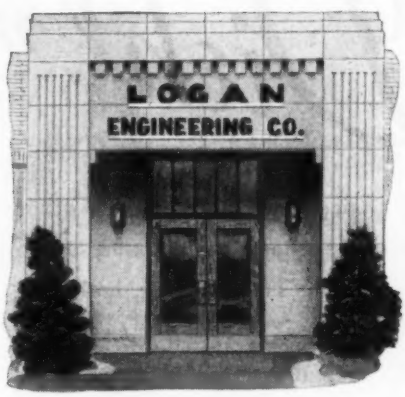
MATTISON MACHINE WORKS
ROCKFORD · ILLINOIS

Logan

...a name to remember when you think of BETTER lathes

A lathe is judged by the kind of job it does, and by nothing else. That one fact explains why Logan Lathes have made such headway. The men in the shops, and the executives as well, *like* the kind of job that Logan Lathes do. There is always a reason when any product wins such wide approval. In the case of Logan Lathes, there are four.

- Advanced engineering characterizes Logan Lathe design, in the spindle mounting, in the countershaft, in the back gear arrangement, in the bed construction, and in many other points.
- More exacting standards and closer tolerances are maintained in building Logan Lathes than were previously thought possible in this field.
- Logan Lathes are built in a new, modern factory, equipped with the best machinery and tooling it is possible to obtain.
- An exceptionally successful management policy, stressing quality of production rather than volume, has produced a personnel of loyal workers who take pride in the Logan Lathe.



Further messages in this series will give you more reasons why it will pay you to see your Logan Lathe dealer or write direct to Logan Engineering Co. for catalog before you invest in a new lathe.

LOGAN ENGINEERING CO.

CHICAGO 30, ILLINOIS

Logan

a name to remember when you think of BETTER lathes

A-1

ACCURATE, SMOOTH CUTTING ASSURED with Diehl number 2

You are assured of accurate, smooth cutting, to exacting specifications, with the Diehl No. 2, for Diehl has belt-driven transmission of power. That is another reason for its unusual popularity among producers of precision products.

The Diehl No. 2 is standard size, working alongside other No. 2 lathes of standard make using same tooling, including collets. It is unsurpassed for sustained, high speed, precision performance, giving years of economical, vibration-free service with ample power to provide for extreme production requirements.

DIEHL NO. 2 LATHES ARE MADE IN 3 MODELS

- Power Feed to Turret—Screw Feed Cross Slide
- Power Feed to Turret—Lever Feed Cross Slide
- Hand Feed to Turret—Lever Feed Cross Slide

Automatic Chuck Capacity (round)	1"
Swing-over cross slide	6"
Swing-over bed	14"
Six speeds...forward and reverse	

WRITE TODAY FOR NEW ILLUSTRATED BOOKLET AND COMPLETE DETAILS

The G. M. DIEHL Machine Works, Inc.

WABASH, INDIANA

WHERE PRECISION CRAFTSMANSHIP IS HONORED.

DoALL Does 8-HOUR JOB in ½ HOUR

The same blanking die that takes 8 hours of tedious drilling and filing to make on the Drill, can be cut by the DoALL in exactly 30 minutes. Not only a 16 to 1 saving in time, but no broken drills, no lost metal.

TRY IT YOURSELF...

If you now use a drill for work of this kind—or a vertical shaper or mill, for that matter—make your own comparative tests and see for yourself how many short cuts DoALL offers in tool room or for regular production work.

If you do not have a DoALL in your plant, one of our factory-trained men will gladly call with a mobile demonstrating unit.

DoALL is today's fastest internal and external method for cutting all metals, alloys, plastics, laminates, wood—blocks a foot thick, bar stock, tubing or stacked sheets.

1. PAINSTAKING CENTER PUNCHING

2. TEDIOUSLY DRILLING ROW OF HOLES

3. HAMMERING OUT THE SLUG

4. FILING OFF THE DRILLMARKS

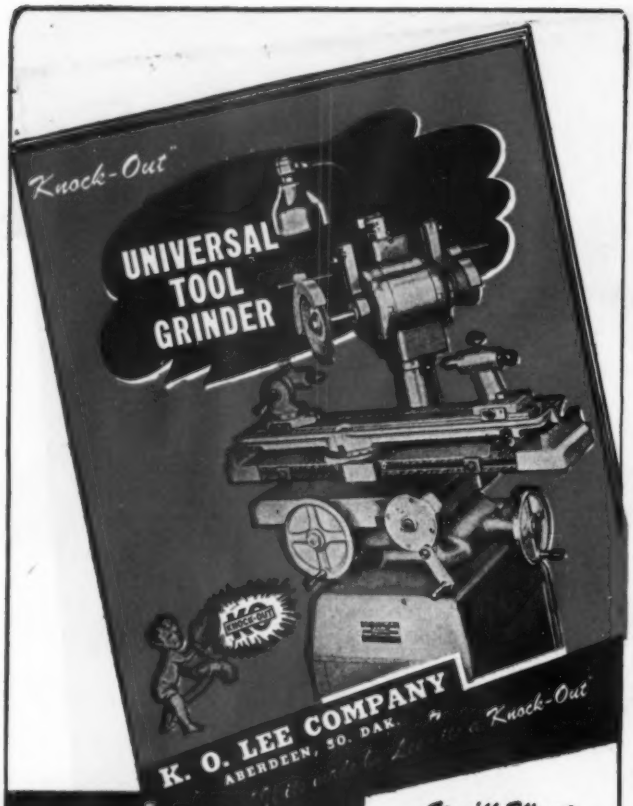
Write for copy of DoALL ADVANTAGES, the illustrated story of 8 interesting jobs.

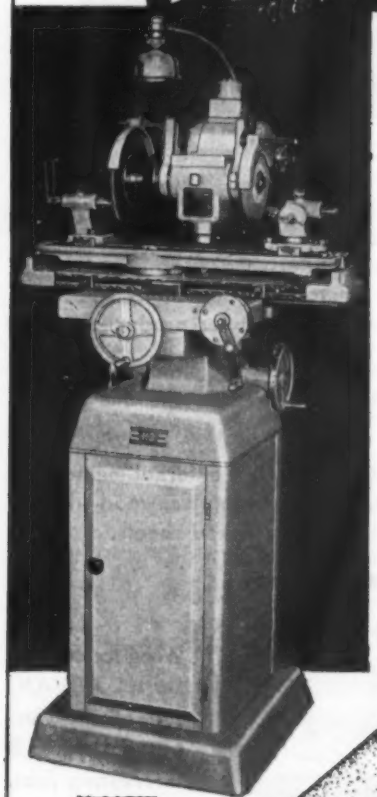
DoALL

INDUSTRY'S NEW SET OF TOOLS

CONTINENTAL MACHINES, INC.
1310 S. Washington Ave. Minneapolis 4, Minn.

Sales & Service Offices: Baltimore, Birmingham, Boston, Chicago, Cincinnati, Cleveland, Denver, Detroit, Erie, Grand Rapids, Hartford, Houston, Indianapolis, Los Angeles, Milwaukee, Minneapolis, New York, Orlando, Philadelphia, Pittsburgh, Providence, Rochester, Rockford, St. Louis, San Francisco, Seattle, Toledo, Tulsa.





You'll Want This New Tool Grinding Book!

Illustrative literature just off the press is now available for the asking. Fifty-two operating pictures, latest improvements in tool grinders. Many time saving grinding fixtures that are adaptable to any make tool grinder.

Detach, fill out and send in coupon today.

Model B660
Knock-Out
UNIVERSAL TOOL GRINDER
NINE OPERATING SPEEDS
1,100 to 11,500 R.P.M.

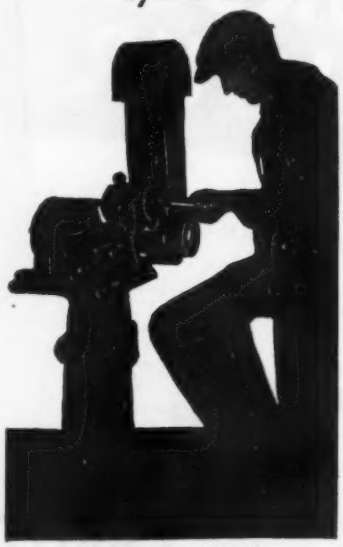
K. O. LEE CO.,
Aberdeen, S. D.

Gentlemen:
Please send me by return mail, and without obligation, your new booklet No. 37-15

Name_____
St._____
City_____ State_____
Name of Company_____

NOTE THESE 9 FEATURES of the "PRODUCTION" TYPES

assuring fast finishing on cylindrical or flat work



1. Two machines in one —a machine that combines a centerless feed polisher with a vertical or horizontal belt surfacer, polisher or buffer.
2. Can be used for cylindrical work or flat, irregular work.
3. Will grind or polish any material.
4. Feed Mechanism quickly removed.
5. Adjustable gauge for bevels.
6. Automatic belt take-up.
7. Tracking device for belt.
8. Direct motor drive.
9. Ball bearing equipped.

Write for further details.

PRODUCTION MACHINE CO.

Manufacturers of Drilling Machines, Tool Grinders and Hand and Automatic Polishing and Grinding Machines.

GREENFIELD, MASS., U. S. A.

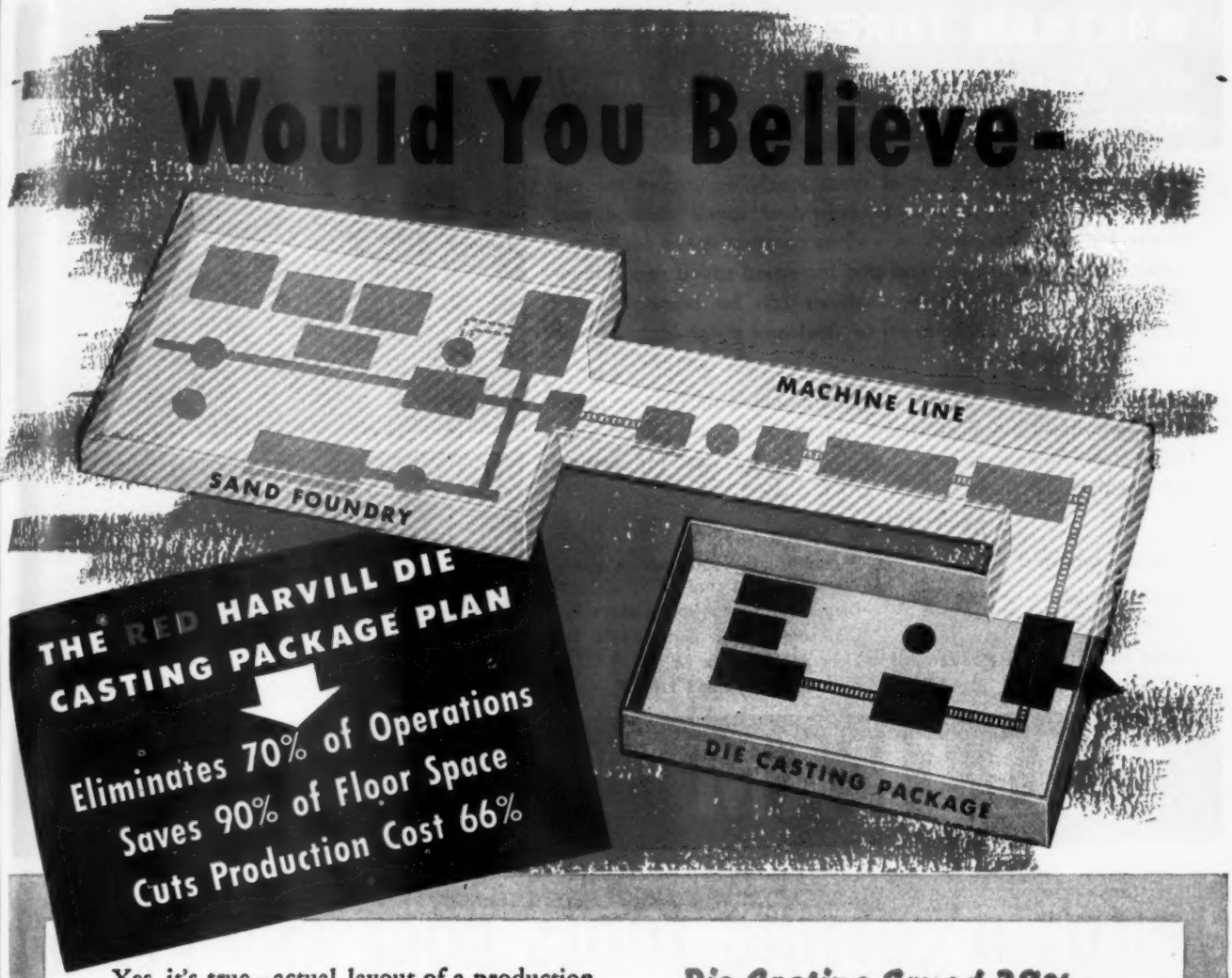
PORTAGE

HORIZONTAL BORING, DRILLING AND MILLING MACHINE NO. 4

• Featuring an extended saddle and table with outer rail support for maintaining exceptional accuracy on long work. Get fully acquainted with the many features of this modern Boring Mill. *Ask for a copy* of our new instructive bulletin which points out the numerous advantages of this new Horizontal Boring, Drilling & Milling Machine.

THE PORTAGE MACHINE CO.
AKRON 11, OHIO

Would You Believe—



THE RED HARVILL DIE CASTING PACKAGE PLAN

Eliminates 70% of Operations
Saves 90% of Floor Space
Cuts Production Cost 66%

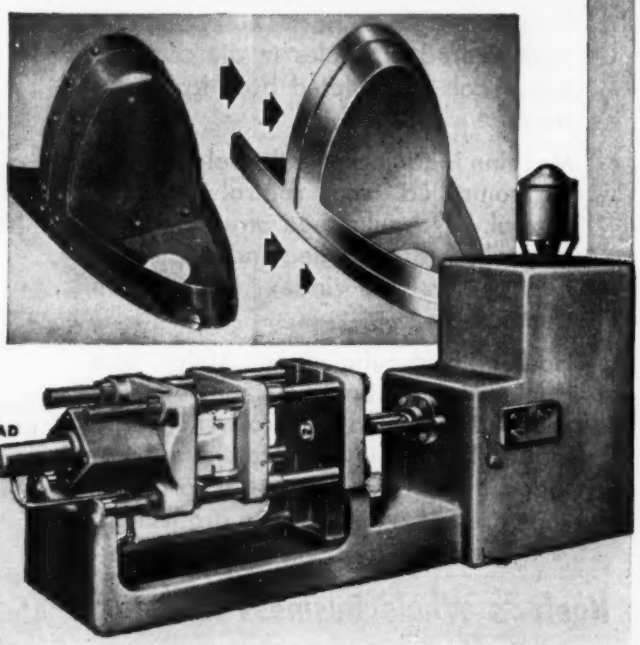
Yes, it's true—actual layout of a production line involving ten operations showed 7 could be eliminated by substituting the Harvill die casting machine package. Plus advantages include lower capital investment, lower inventories and increase in daily output. A cure for the "Reconversion Jitters" for this company!

See RED and be ready

If you manufacture from metal, discuss your plans now with Red Harvill and be ready to meet stiff competition in your post-war market by the use of die casting as your newest machine tool.

Die Casting Saved 38%

Case History No. 78. Sheet assembly of 6 pieces (left) requiring 30 rivets converted to one-piece die casting at saving of 38% and weight reduction of 27%. "Red" can do the same for you.



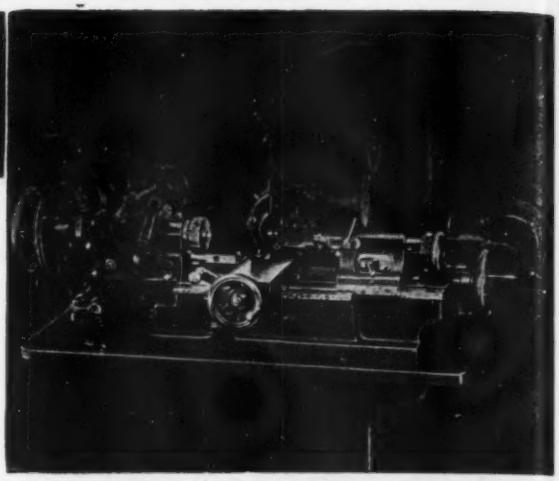
WRITE TODAY FOR BROCHURE ON FIRM LETTERHEAD

H. L. RED HARVILL MFG. CO.

POST OFFICE BOX 335-I VERNON, CALIFORNIA

WALTHAM THREAD MILLERS

are designed especially for small work requiring close tolerances



Improvements in the design of these machines involve the use of three motors which provide individual speed change and reverse for cutter and work as well as constant speed for pump. Greater rigidity of cutter head and increased speed range have also been achieved. These machines can be arranged with speeds suitable for either brass or steel and by changing ratios can be used for both.

Standard equipment includes machine mounted on cabinet base, motors with push button start and automatic or push button stop, follow rest, milling cutter, and indexing device for cutting multiple threads.

SPECIFICATIONS

Swing over carriage 3"

Capacity (Diameter of work) 2" or smaller

Thread length (work held on centers) 8¾"

Thread length (work held in spring chuck at one end) 10"

Diam. hole through spring chuck ⅝"

Dia. hole through work spindle ¾"

Floor Space 48" x 34"

Motors: 1/3-1/4 and 1/6 HP

Waltham Thread Miller equipped with Internal Threading Attachment

Machine equipped with Relieving Attachment

Send for literature giving complete information.

WALTHAM MACHINE WORKS

WALTHAM, MASS.

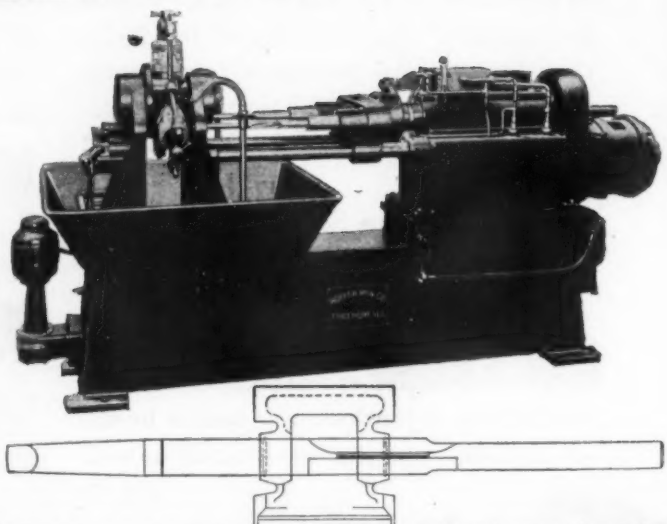
WALTHAM TRADE MARK REGISTERED U.S. PAT. OFF.

PILOTED CUTTING TOOLS BORE AND REAM DIE CASTINGS

★ This single end Hoefer Machine has a 5 h. p. unit on which is mounted 2 spindle heads tied to a 3-station index fixture by guide bars. It bores and reams cored pin holes in die cast pistons. Tools are piloted both front and rear.

Machine is equipped with coolant pump all controlled from central electrical control. Hydraulic feed of unit is automatically started when index plunger fully enters the index bushing on trunnion.

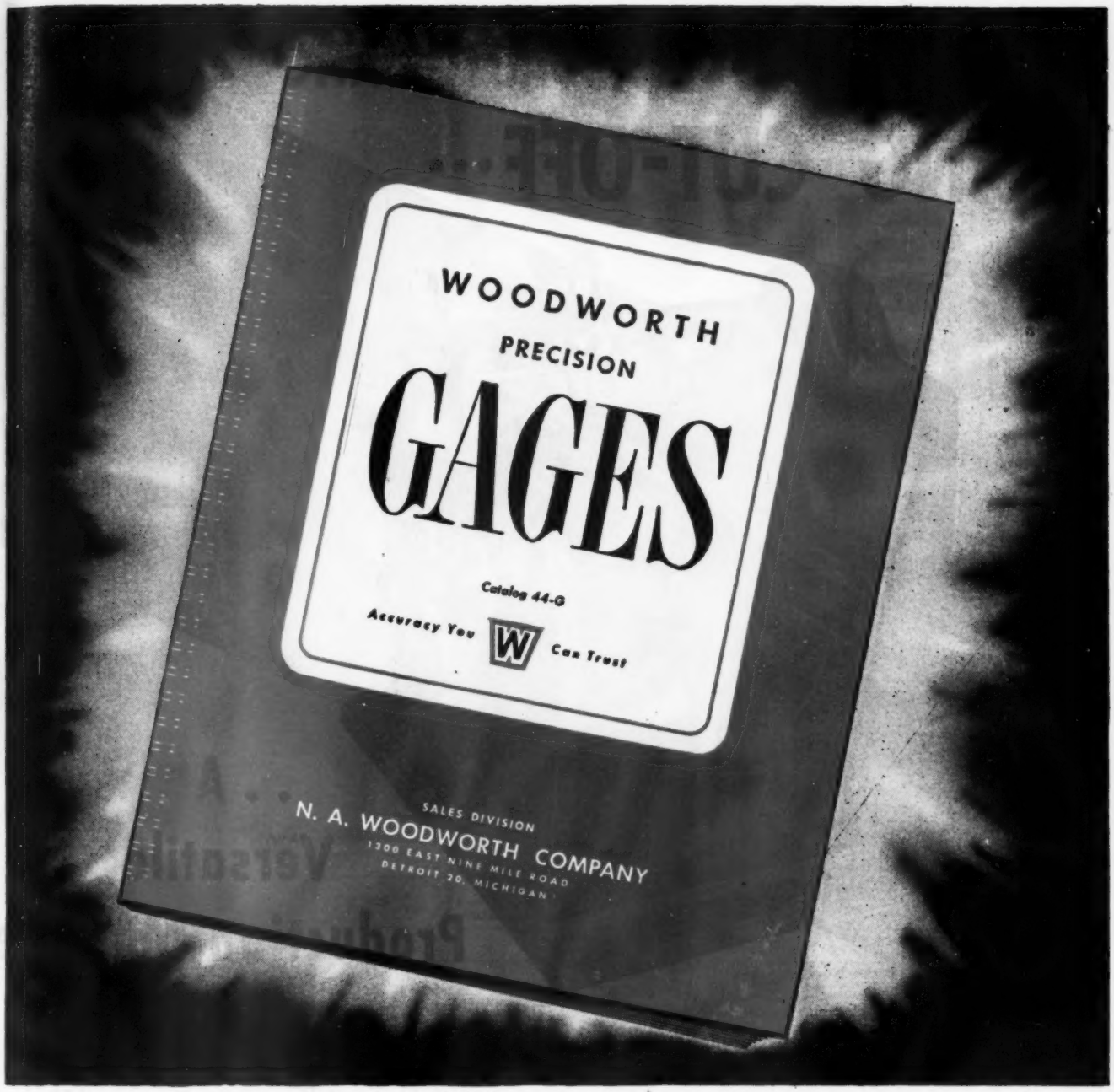
Hoefer Hydraulic Feed Units plus Hoefer Multiple Spindle Heads offer an economical solution to production drilling problems. Investigate the advantages of this equipment as concerns your present and post war production.



Cutter turns 573 r. p. m. with penetration of 12,652" per minute and 3½" total travel. Time required is 15½ seconds if feed moves full length at .024" per revolution. Requires only 9 seconds if reamer travels through the two ⅞" bosses and jumps center gap of 1¾". This can be done with an adjustable jump mechanism furnished as an extra.

Hoefer's Whole Business is Holes • • • •

HOEFER MFG. CO. *Freeport, Ill.*



A New Catalog of Gages by Woodworth

The new Woodworth Gage Catalog is now available to gage users. This catalog contains complete information on Woodworth gages, shows you how to reduce costs with gages of cast Stellite alloy, tells about the Carboloy gages with the exclusive segmented shank that "breathes" and the story of the famous Woodworth Limitrol comparator gage. For the first time, the H-28 Standards Data is compiled in a catalog, also other important gage data that will help you to speed production and reduce costs. Write for your copy today.

N. A. Woodworth Co., Sales Division
1300 E. Nine Mile Road, Detroit 20, Mich.
Gentlemen: Forward a copy of the new Woodworth Gage Catalog to—

Name_____
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ACCURACY YOU W CAN TRUST

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD · DETROIT 20, MICHIGAN

PRECISION GAGES · PRECISION MACHINED PARTS · PRECISION TOOLS

Yoder AUTOMATIC FLYING CUT-OFF...

. . A Versatile Production Machine

The Yoder Automatic Cut-off Machine is designed primarily to be used in connection with a roll-forming machine, for cutting formed sections on the fly. The forms it will cut, cleanly and accurately, are as varied as your needs. Cutting is accomplished by steel dies, mounted on a movable die-table, and actuated by crankshaft driven by compressed power springs, which are re-loaded automatically while the die-table is being returned to position for another cut. Accurate dies, swift, powerful strokes, assure smooth cuts to extremely accurate lengths, on even the most intricate section.

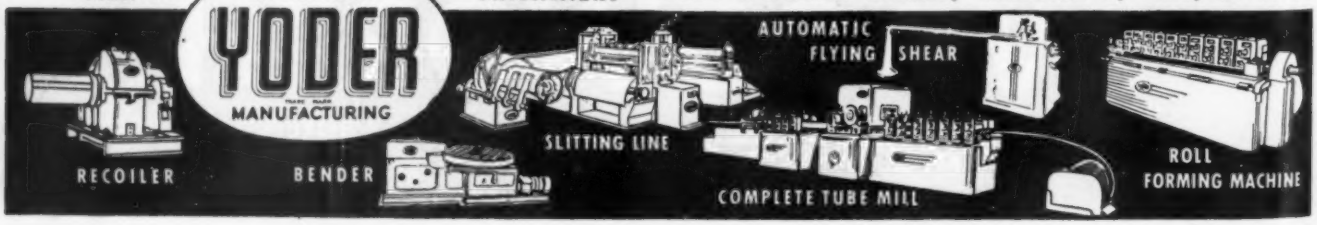
In addition, this machine may be productively used for straightening or cutting tubing, wire or rods or coil strip stock. It may be fitted with dies or punches for perforating and embossing . . . it is a versatile production machine capable of sustained earning operation. ***Let us send you a booklet with complete details.***

THE YODER COMPANY

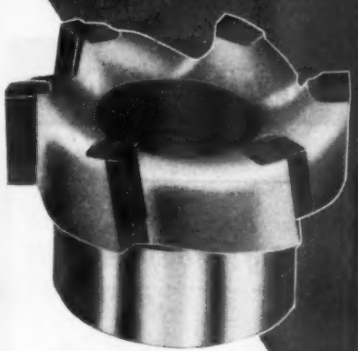
5514 Walworth Avenue, Cleveland 2, Ohio, U. S. A.

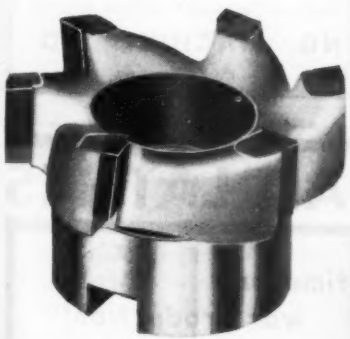
METAL • WORKING • PRODUCTION • MACHINERY

ENGINEERING YODER MANUFACTURING



LOOK! NEW LOW PRICES ON SUPER SHELL END AND FACE MILLS!





It's true! Down go prices on SUPER Shell End and Face Mills! Ever increasing orders from users, improved manufacturing techniques, increased production facilities, engineering research and development . . . these are reasons why the new low prices shown below are possible.

If you have been using SUPER Shell End and Face Mills you know of the production economies resulting from the faster cutting and the cleaner cutting that these tools produce. You know, too, of the finer finishes, the greater accuracy and the longer tool life with these cutters on the job.

Now add to these economies the savings you get from these new low prices and you'll agree . . . SUPER Milling Cutters are *real* MONEY SAVERS!

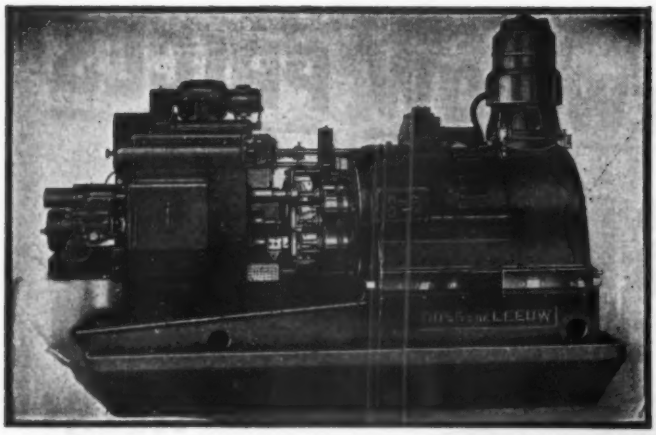
PRICE LIST

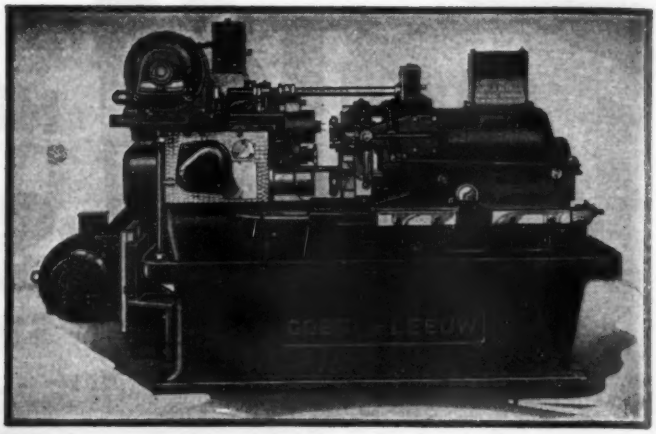
SIZE	FOR GENERAL USE		FOR STEEL		NEW PRICE EACH
	No. of Teeth	Stock Number	No. of Teeth	Stock Number	
SHELL END MILLS					
1¼"	4	GSM-1	6	SSM-1	$17.00
1½"	4	GSM-2	6	SSM-2	18.00
1¾"	4	GSM-3	6	SSM-3	19.00
2"	4	GSM-4	6	SSM-4	19.50
2¼"	6	GSM-5	6	SSM-5	20.00
2½"	6	GSM-6	6	SSM-6	20.50
2¾"	6	GSM-7	6	SSM-7	21.50
3"	6	GSM-8	6	SSM-8	22.50
3½"	6	GSM-9	6	SSM-9	25.00
4"	6	GSM-10	6	SSM-10	27.50
4½"	6	GSM-11	6	SSM-11	32.00
5"	6	GSM-12	8	SSM-12	35.00
5½"	6	GSM-13	8	SSM-13	37.00
6"	6	GSM-14	8	SSM-14	40.00
FACE MILLS					
8"	8	GFAC-8	10	SFAC-8	60.00
10"	8	GFAC-10	12	SFAC-10	75.00

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Rd., Detroit 13, Mich. 4105 San Fernando Rd., Glendale 4, Cal.





WORK ROTATING TYPE

5 Spindles
6 Spindles
8 Spindles

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES

TOOL ROTATING TYPE

4 Spindles
5 Chucking Positions

On these machines, two threading operations can be handled simultaneously, each thread controlled by its own lead screw.

Among the many other modern features offered in both types are: pre-loaded anti-friction spindle bearings, hardened ways, oversize spindles and gears of chrome-nickel steel, heat-treated.

Complete details will be found in descriptive catalog available on request.

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

ABRASIVE

ACCURACY BOOSTS PRODUCTION

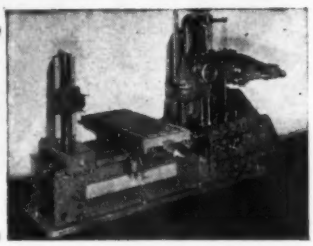
No. 1G	INTERNAL GRINDER	**No. 34**	VERTICAL SPINDLE SURFACE GRINDER
No. 1½	HAND FEED SURFACE GRINDER	**No. 3B**	AUTOMATIC FEED SURFACE GRINDER

Look for Our Full Page Advertisements

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, RHODE ISLAND

UNIVERSAL *Horizontal Boring Machine*
The only TRIWAY *Boring Machine Built*

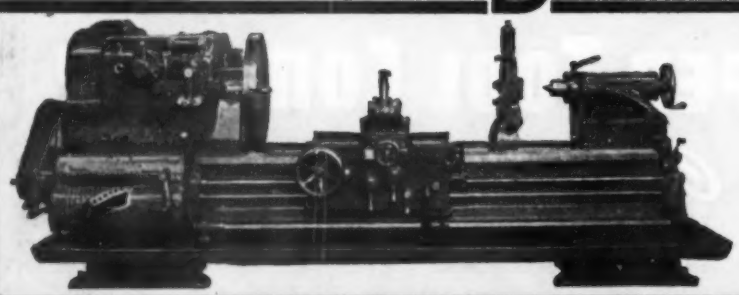
Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.



Standard Universal 3" Spindle Machine

UNIVERSAL BORING MACHINE CO.
Hudson, Mass., U. S. A.

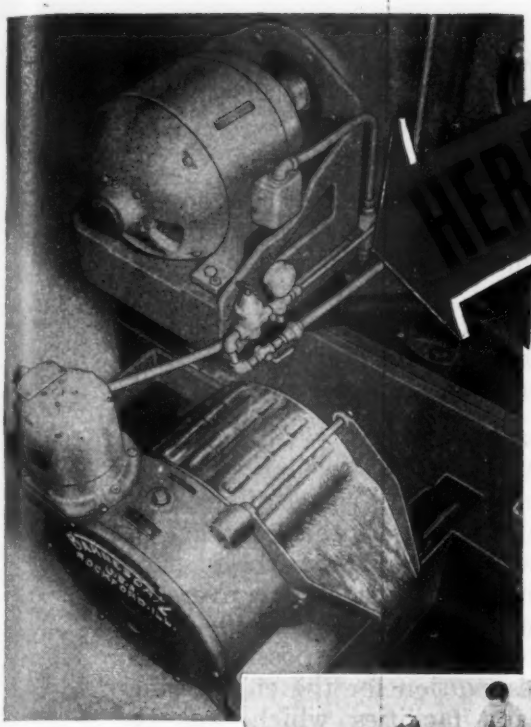
SPRINGFIELD GEARED HEAD LATHES



for peacetime or war production!

A lathe purchased now, for round-the-clock war production, must still meet peacetime requirements. Therefore, specify SPRINGFIELD lathes —flexible, efficient, ideal for emergency or normal production. SPRINGFIELD lathes are built in sizes from 14" to 30". Write for descriptive bulletins, prices, deliveries, etc.

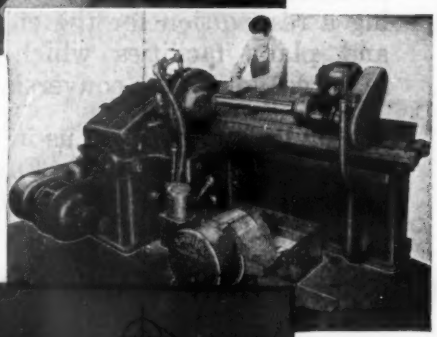
The SPRINGFIELD MACHINE TOOL COMPANY • • • SPRINGFIELD, OHIO, U.S.A.



BARNESDRIL *Coolant Separator on a* BARNESDRIL *honing machine.*

HERE IS THE NEW WAY TO...

Clean HONER AND GRINDER Coolants Automatically



BARNESDRIL *Magnetic-Automatic Coolant Separator in use on a cylindrical grinder.*

Internal structure of magnetic separator showing magnets and grid.

BARNESDRIL *Coolant Separator Removes Harmful Metal and Abrasive Particles Magnetically . . . Little Maintenance Required*

BARNESDRIL Magnetic-Automatic Separator offers a new economical way to keep your honer and grinder coolants free of harmful foreign matter. Metal particles adhere to the magnetic rotary drum up-ended in a definite comb-like pattern. As the extended particles pass through the coolant, detrimental non-metallic materials are also combed out as the drum rotates. The complete mass is scraped off as the drum turns. A discharge chute carries the swarf or sludge to a removable pan. Constant removal of swarf keeps the reservoir clean—and clean coolant gives a smoother finished job. This maintains the maximum gallonage of coolant which gives the greatest degree of heat elimination.

No Filters to Clean or Change

Continuous separation takes place automatically. There are no filters to clean or change. The operator devotes his time to productive work, using the start-and-stop button to run the separator continuously or intermittently. He can observe the amount of swarf accumulated on the magnetic drum and thus determine the amount of stock being removed.

This BARNESDRIL Magnetic-Automatic Coolant Separator is now available in two sizes. One will handle 10 gallons of coolant, the other 20. Other sizes may be supplied if required. You can be assured of a clean coolant supply at all times by installing one of these trouble-free magnetic separators on your honing or grinding equipment. BARNESDRIL engineers will be glad to recommend the correct size unit for your machine.

How Magnetic Attraction is Used

The magnetic separator is made up of a series of permanent magnets mounted on the inside of a rotating drum. The face of this drum is covered with a non-magnetic sheet through which the magnets attract and hold all metal fragments. To extend these metal particles on end to form the filtering screen, an induction magnetized apron grid is used.

Free Data...

Write for descriptive Bulletin No. A151-A and learn how this magnetic separator can be used to advantage on your machine.

Barnes Drill Co. • 830 CHESTNUT STREET ROCKFORD ILLINOIS, U. S. A.

Conversion Job... from BORING to MILLING

and at a substantial saving in machine cost

This Snyder two-way machine originally was designed and built for a medium boring operation on an ordnance part. When that particular contract was completed, the machine was turned over to Snyder for conversion to a milling operation on another ordnance part.

The conversion process utilized most of the original machine including base and units. Two single-spindle heads were mounted on each end, these being hydraulically operated and electrically controlled by push button.

Besides the considerable saving in time, there accrued also a saving of approximately 50% as compared to the cost of a new machine.

Many machines now operating on war contracts are similarly convertible and offer comparable opportunities for savings in time and money. The time-saving feature will be particularly important when the objective is to reach markets with civilian goods as quickly as possible.

Anticipating the day when war contract machines will become available for conversion to peacetime production, we suggest that you get in touch with us now with the idea of discussing your machine conversion problems and objectives and—as a farsighted precaution—possibly making a reservation for the engineering and plant facilities which will be required for your conversion work.

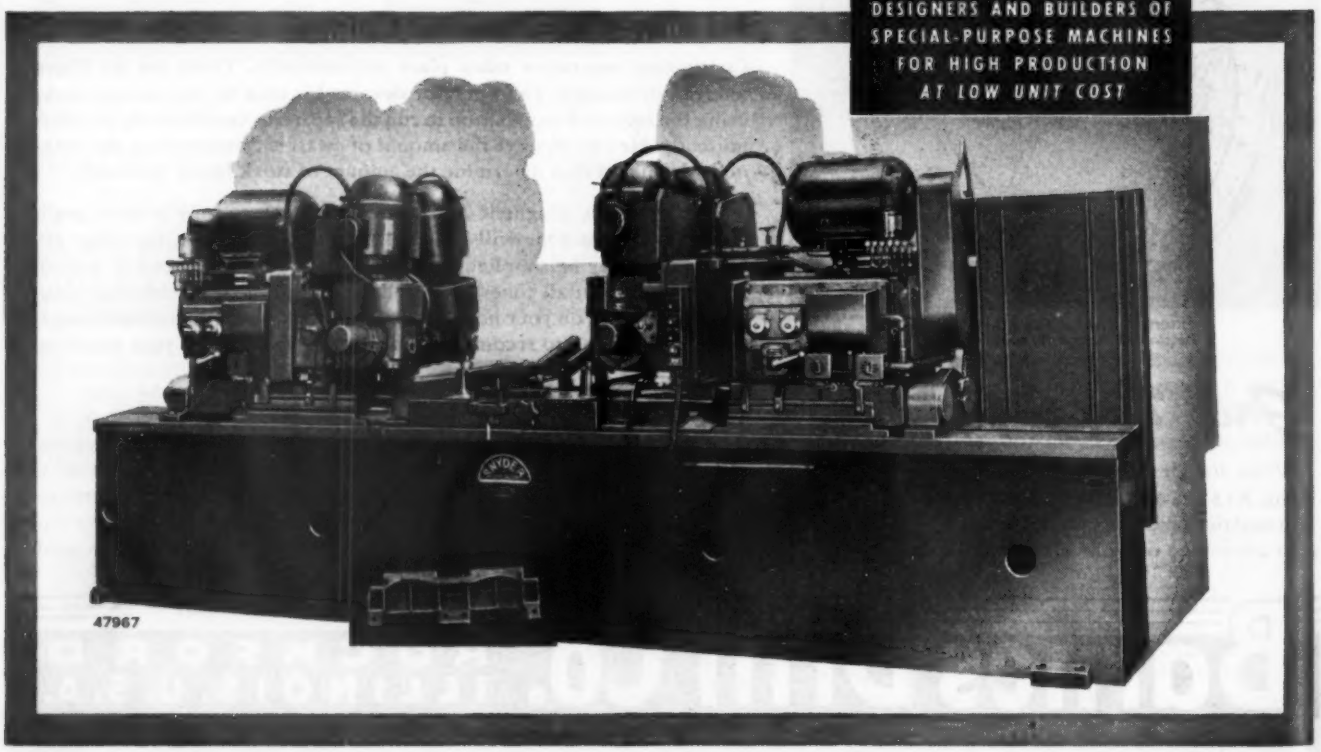
We invite you to write us in full confidence. *Snyder Tool & Engineering Company, 3400 E. Lafayette Ave., Detroit 7, Mich.*

PLAN Your PRODUCTION when you PLAN Your PRODUCT

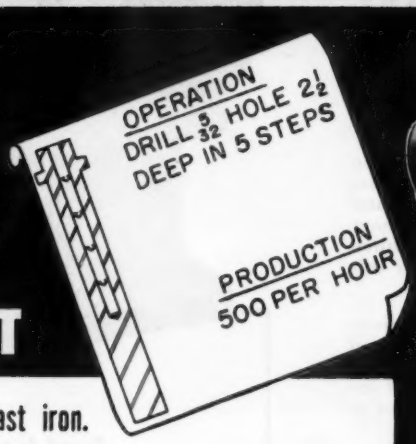
20 Years of Successful Co-operation with Leading American Industries

SNYDER

DESIGNERS AND BUILDERS OF SPECIAL-PURPOSE MACHINES FOR HIGH PRODUCTION AT LOW UNIT COST



Avey Automatic METHOD No. 8



THE Avey CAM FEED UNIT

No. 1 Size—1/2" capacity in cast iron.

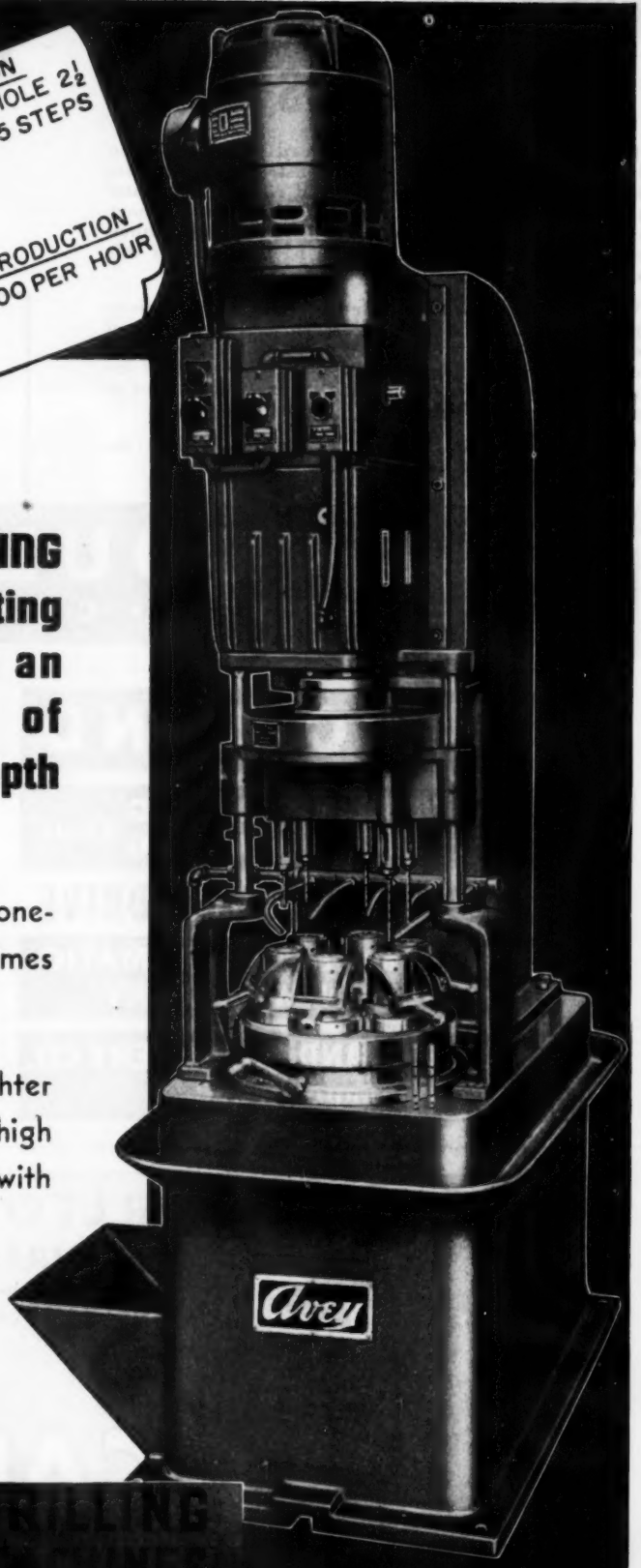
No. 2 Size—7/8" capacity in cast iron.

Designed for DEEP HOLE DRILLING—(step method)—using rotating table—each station drilling an additional depth. Number of station required depends on depth to be drilled.

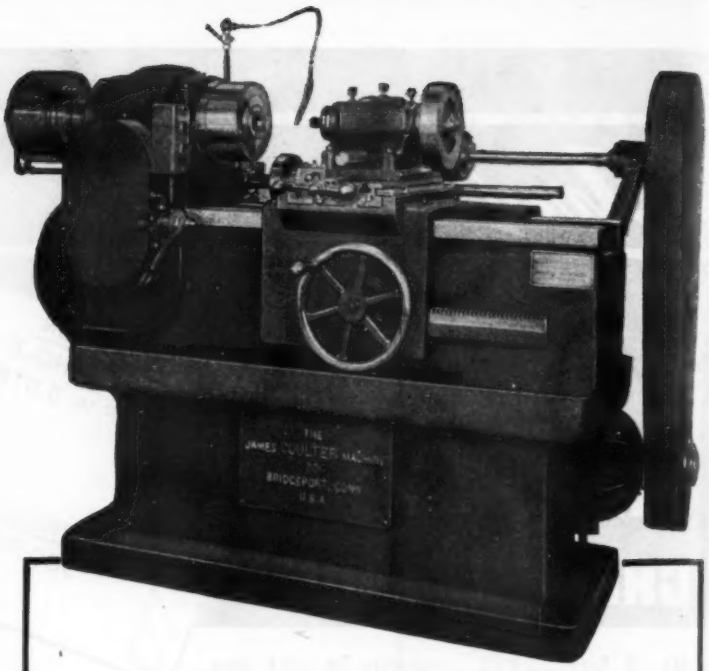
Deep hole drilled in time required to drill one-fifth of depth — free loading time and five times single spindle production.

METHOD No. 8—Higher production, straighter hole, better chip and coolant condition — high quality work obtained speedily, efficiently with a minimum of supervision.

THE AVEY DRILLING MACHINE CO.
CINCINNATI • OHIO • U. S. A.



Keep Ahead of
DEFENSE DEMANDS
on the PRODUCTION of
EXTERNAL and INTERNAL THREADS



The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7"; minimum hole depends on smallest hob practical.

Send for Descriptive Bulletin giving full information.

The James COULTER *Machine Co.*
BRIDGEPORT • CONNECTICUT • U.S.A.

MILLHOLLAND
Automatic DRILLING - BORING MILLING - TAPPING *Units*

½ to 20 HORSEPOWER DRIVE

AUTOMATIC and SEMI-AUTOMATIC PRODUCTION MACHINERY

W. K. MILLHOLLAND MACHINERY CO.
Indianapolis, Ind.

Giant KEYSEATERS
For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

MITTS & MERRILL
918 Tilden St.
Saginaw, Michigan

LUCAS "PRECISION"
Horizontal Boring, Drilling and Milling Machine
THE LUCAS MACHINE TOOL CO.

NOW AND ALWAYS OF

CLEVELAND
OHIO, U. S. A.

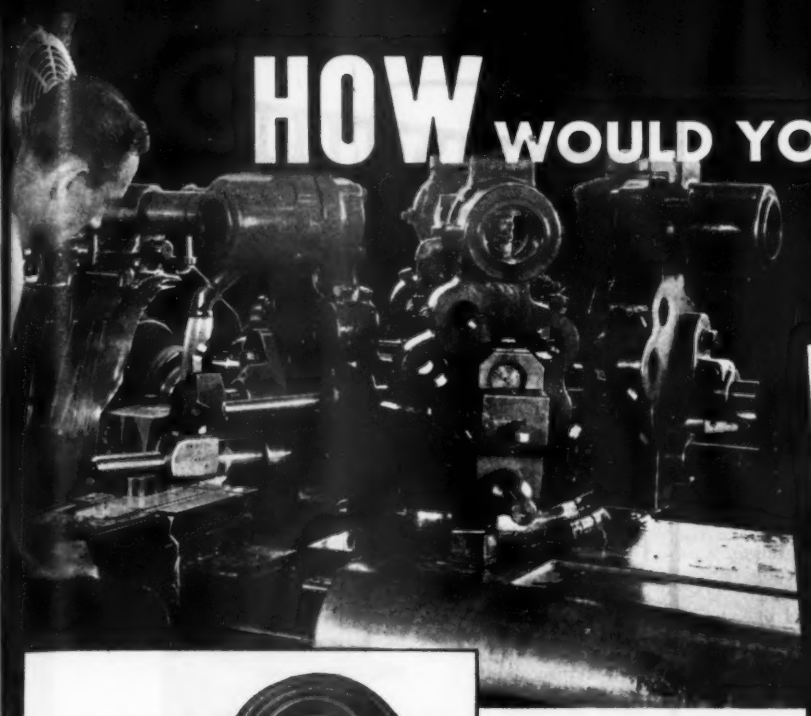
"Anti-friction Bearings Throughout"

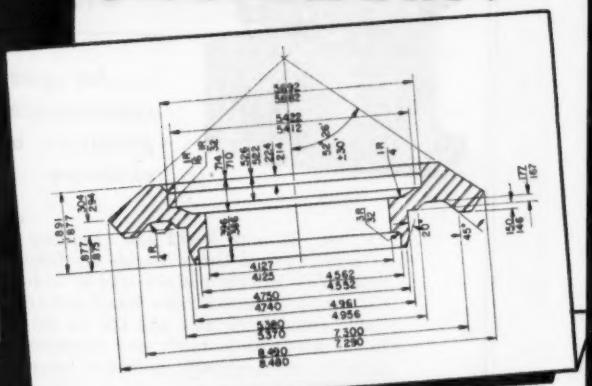
CARLTON RADIAL DRILL
FEATURES—1. Low Hung Drive to the Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all speeds. 4. Concentrated and Convenient controls. 5. Constructed on Unit Principal.

The CARLTON
MACHINE TOOL COMPANY
CINCINNATI, OHIO, U. S. A.

ARMY E NAVY

HOW WOULD YOU MACHINE THIS PROPELLER GEAR BLANK?





Rough Forging

Finished Gear Blank

PART FACTS:

- ✓ 31 operations total
- ✓ 2 chuckings per piece
- ✓ S.A.E. 3312 steel forging

Here is How this Manufacturer Does It in 6⅔ minutes Per Piece on Two Fastermatics

Here Are the 31 Operations Performed on Fastermatics

FIRST CHUCKING:
(1) Rough face gear, (2) face hub, (3) rough bore hub, (4) counterbore hub, (5) rough turn hub, (6) face shoulder, (7) rough form, (8) finish face gear, (9) face hub, (10) semi-finish bore hub, (11) semi-finish counterbore, (12) turn hub, (13) face shoulder, (14) finish bore hub, (15) finish counterbore, (16) finish turn hub, (17) face shoulder, (18) finish form gear, (19) chamfer counterbore, (20) form 20° angle.

SECOND CHUCKING:
(21) Rough form gear, (22) rough face end, (23) rough bore, (24) turn O.D., (25) form seat, (26) rough turn angle, (27) finish form angle, (28) finish face end, (29) finish countersink, (30) finish form seat, (31) finish turn gear face angle.

MATERIAL:
Steel forging S.A.E. 3312 Brinell 229.

PRODUCTION:
First chucking—6 minutes, 40 seconds. Second chucking—6 minutes, 11 seconds floor-to-floor time.

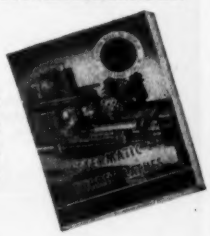
● This large mid-western propeller manufacturer gets a finished gear blank every 6 minutes and 40 seconds from two Foster Fastermatic Automatic Turret Lathes performing the 31 operations, listed in the panel at the left, in two chuckings. Ten of these operations are multiple cuts performed simultaneously in combined cross slide and turret movements. Two speeds and 11 feeds, all automatically changed are used in the complete machining cycle.

Fastermatic's pace-setting production records and close-tolerance precision result from the exclusive Foster features of automatic speed control and hydraulic feed system. Neither the operating speed of the machine nor the accuracy of the finished piece depends upon the skill or training of the operator—the only duties he performs are loading and unloading. All machining operations—including combined cross slide and turret movements—are entirely automatic. Consequently, as in this case, one operator usually handles two or more Fastermatics at a considerable savings in time and expense.

You undoubtedly can achieve similar production economies by installing Fastermatic Automatic Turret Lathes in place of less efficient manual or semi-automatic equipment. Foster engineers will gladly compute the savings possible with Fastermatics on your work—there is no obligation whatever for their recommendations.

Free ***To Production Men Who Want to Improve Output and Lower Turning Costs***

Learn how Fastermatics can help you machine complicated jobs at a saving. Write today for your copy of the new Fastermatic Catalog complete with facts and technical data on these high-production, entirely automatic, turret lathes. Address Foster Division, 1100 Beardsley Avenue, Elkhart, Indiana.



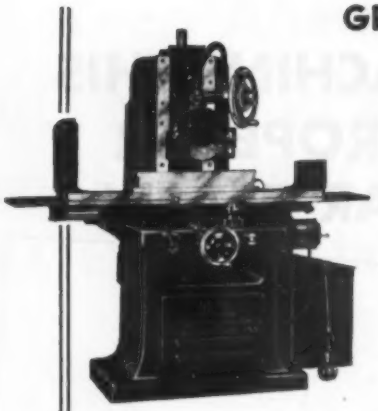
INTERNATIONAL MACHINE TOOLS

Foster Division - Elkhart, Indiana

INTERNATIONAL DETROLA CORPORATION

DETROIT, MICHIGAN • ELKHART, INDIANA • INDIANAPOLIS, INDIANA

FOSTER FASTERMATICS • LIBBY HEAVY DUTY TURRET LATHES • STANDARD TOOLS • SUPERFINISHING MACHINES • SPECIAL MACHINE TOO



GRAND RAPIDS

No. 35

Hydraulic Feed

SURFACE GRINDER

. . . for speed, convenience, precision and economy

The No. 35 with 8"x12"x24" capacity—is one of many sizes of Grand Rapids machines of this type. Wide flexibility is provided by hydraulically operated longitudinal table travel and cross feed. Table speed is variable and can be obtained up to the maximum instantly and conveniently. Adjustable, automatically operated cross feed is provided.

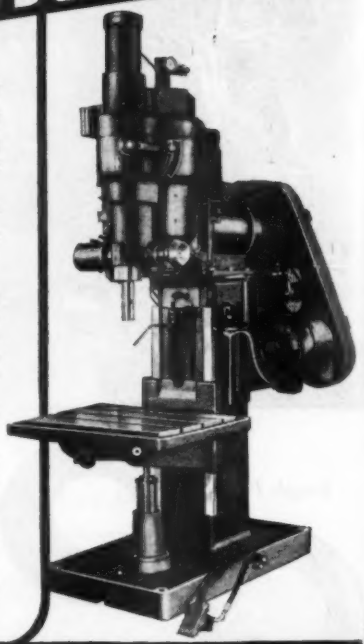
Send for Bulletin GL 100 containing full details.

GALLMEYER & LIVINGSTON CO.

330 STRAIGHT AVENUE

GRAND RAPIDS (4), MICH., U.S.A.

FOR CONTINUOUS HIGH DUTY PRODUCTION . . .

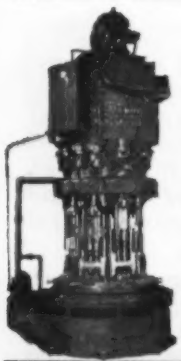


Kaufman #10A. Hi-Duty single spindle. Lead Screw Tapper made in 3 HP and 1½ HP models, with ¾" N.C. and 1½" N. C. Threads in alloy steel offers these features:

FULLY enclosed . . . . lead screw and nut operate constantly in oil bath . . . positively wear-proof clutches instantly engaged and controlled by air cylinder . . . quick traverse when not actually cutting threads . . . accurate depth control . . . control to protect tap overload, and further protected against jamming if work is placed in upside down . . . class 3 fits always assured and perfectly controllable. Complete information upon request.

KAUFMAN MFG. CO.

MANITOWOC, WISCONSIN



Vertical ROTO-MATICS

Multiple spindle drill heads and automatic clamping provide added production.

Continuous operation is essential for maximum production. VERTICAL ROTO-MATICS are continuous operating, multiple spindle, non-indexing machines that are adaptable to a wide range of machine problems. . . . *Bulletins 110 and 120* may help you solve your problems. Write for them.

Davis and Thompson Co.

Mfrs. of Machine Tools and Micrometers

6411 W. Burnham St. Milwaukee 14, Wisconsin

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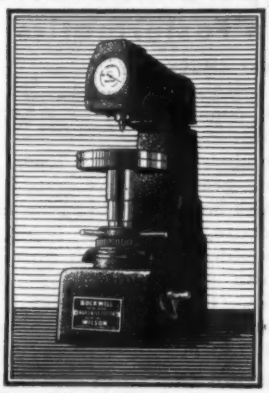

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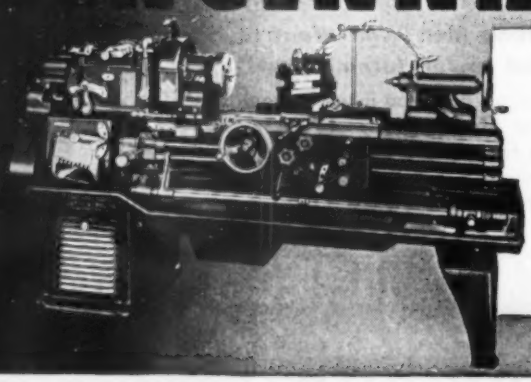
CINCINNATI LATHES



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Adaptability & Versatility of Cincinnati Lathes are well recognized in the best shops everywhere. It is a simple matter to set-up from job to job and to maintain high production on every one because of the many convenient tooling attachments and arrangements which Cincinnati engineers have developed for these machines to handle specific machining problems. May we help you too.

Cincinnati Lathes—fully described in catalog available on request—produced in sizes from 14" to 30".

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Rogers Road, Oakley SPECIALISTS SINCE 1906 Cincinnati, Ohio

FOR ANY HOIST OR HAUL...

Hyster 75 Lift Truck (7,500 pounds capacity) transporting and stacking barrels

One of the hardest working lift trucks in industry is the Hyster 75—used to hoist, transport and stack loads weighing up to 7,500 pounds. It is powered with a 40 h.p. watercooled gas engine and can travel 11 miles per hour.

Like all Hyster lift trucks the "75" rolls on pneumatic tires; operates equally well on rough road surfaces or smooth streets.

A distinctive operating feature of the Hyster 75 is its three wheel arrangement with the steer wheel mounted in a trunnion for greater maneuverability. Triangular body design with tapered rear enables the "75" to get about easily on crowded floors. The truck is built low, has great stability, a standard lift of 9 feet and handles 7,500 pounds on 42-in. yard arms.

Hyster makes a complete line of trucks ranging from 2,000 pounds to 30,000 pounds capacity. Illustrated literature sent on request.

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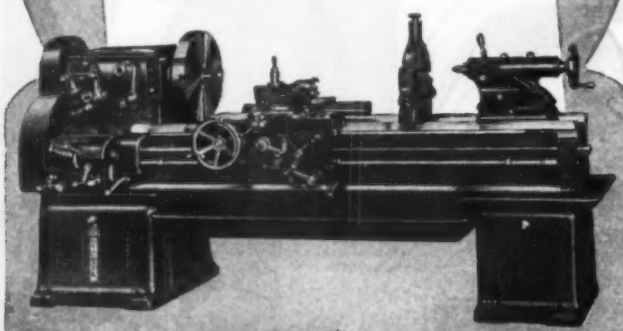
Catalogs sent on request. Write for yours!



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Double-End Screw Traverse Spooling Machine . . .

For multiple-end winding of fine wires—sizes .008 to .030 up to twelve ends on each spool.

Delivers a smooth, uniform lay at speeds from 40 to 800 feet per minute—depending on size and kind of wire.

Tension and brake control prevent overrunning; slow acceleration avoids wire breakage, and adjustments provide for various wire sizes and types.

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Intricate, Automatic Precision Machines

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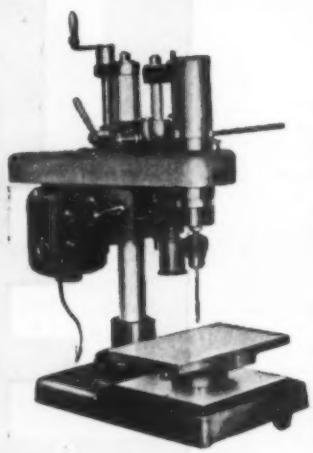

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• Designed and built for accurately drilling small holes .004" to .250" diameter. It consists of a self-contained drilling unit which swings radially on the column and may be locked in any desired position.

Here's an exceptionally flexible small drilling machine which is easy to operate and may be ganged for sequence operations or to obtain greater production.

Another distinct advantage is the full floating spindle of special design which eliminates radial belt pull on the spindle.

Distance from center of chuck to column, 5 inches. Vertical work capacity from base to chuck, 10 inches. Spindle speeds from 750 to 12,000 R.P.M. Write for full descriptive bulletin.

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This low cost machine will handle internal keyseating jobs up to 1¼ in.

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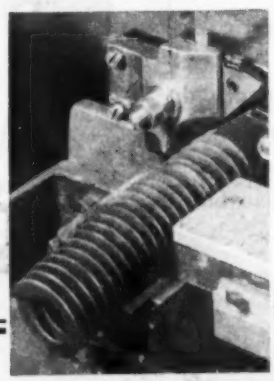

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This machine—designed and built by SEIFERT—automatically winds Nichrome wire on edge into spirals for induction heating elements. It typifies one of the many automatic machines SEIFERT has made for leading manufacturers here and abroad.

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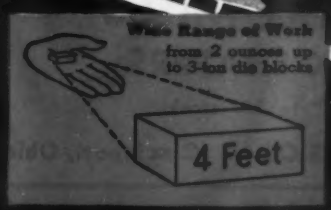

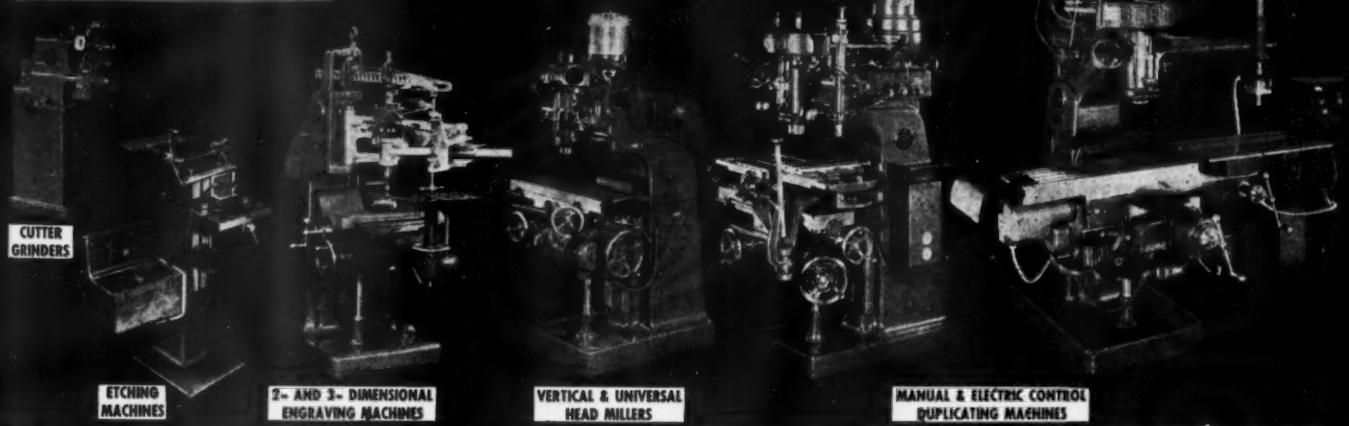

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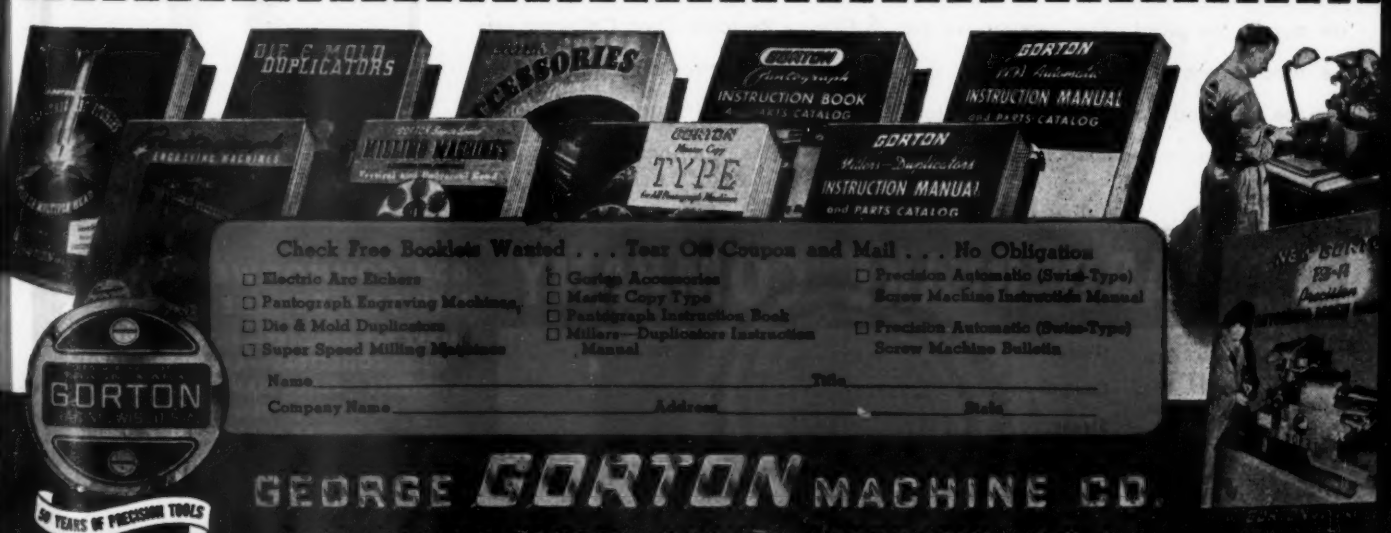

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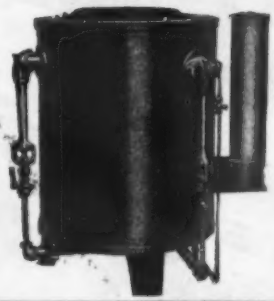

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CRANK SHAPERS
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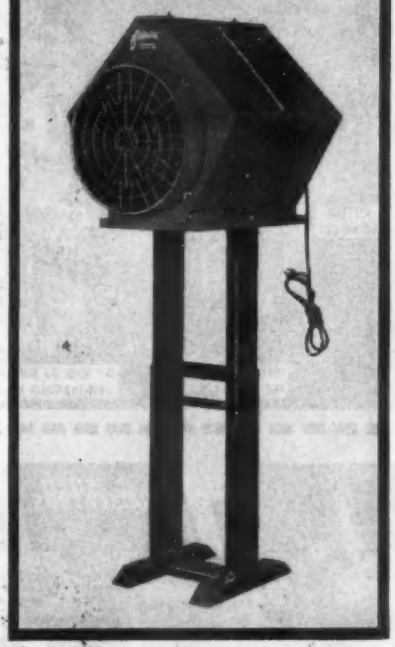

Dust is *expensive!* And, when allowed to circulate freely throughout your shop, it will ruin expensive machine tools and other plant equipment. Many dust collecting systems are *expensive* too—particularly in winter when they exhaust heated air out of the plant. The *inexpensive* No. 2 Filtaire Portable Dust Collector can be used wherever dusty operations are performed—it recirculates warm air—it can be changed quickly from job to job—it has replaceable spun glass filters—it does not require special hoods or piping. *Mail the coupon today for full information!*

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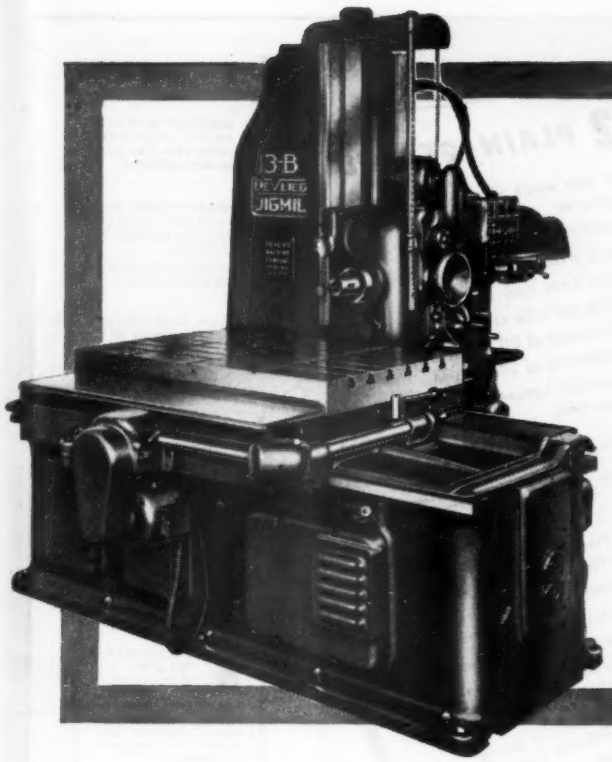

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The JIGMIL has proven to be a totally new approach to the problems of economical precision BORING and milling . . .

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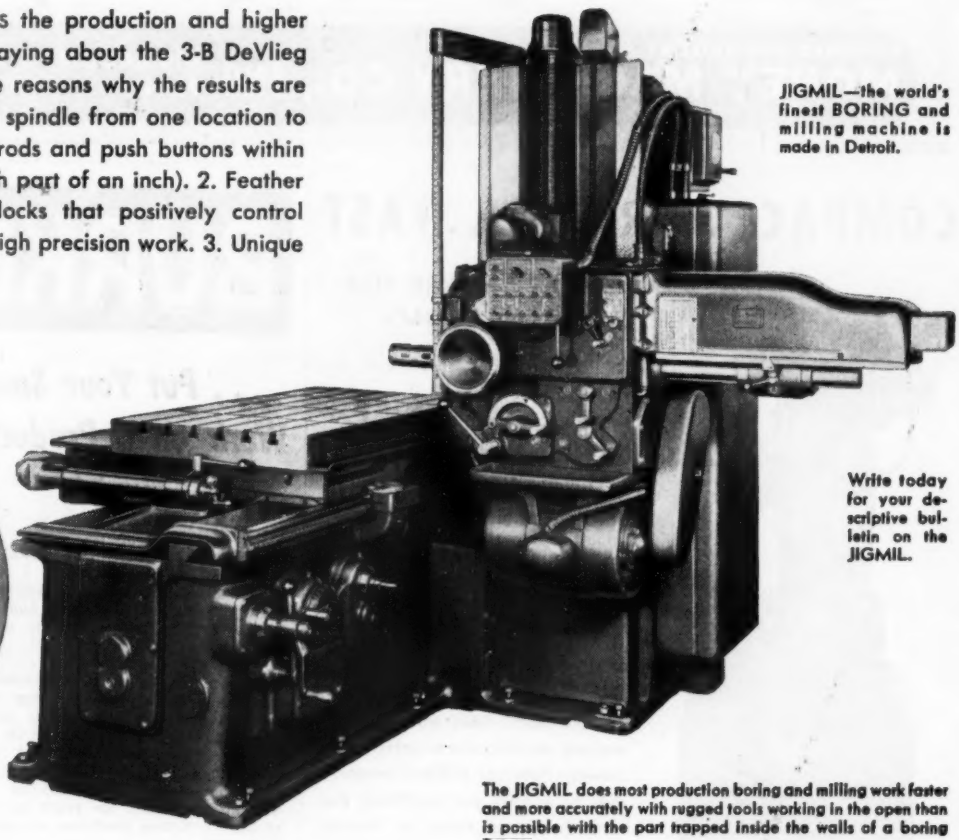
"TWO TO THREE TIMES the production and higher quality work" is what users are saying about the 3-B DeVlieg JIGMIL—and here are some of the reasons why the results are better: 1. Automatic positioning of spindle from one location to another in response to measuring rods and push buttons within less than .0001 (one ten thousandth part of an inch). 2. Feather touch, pressure controlled slide locks that positively control locking uniformity, so essential to high precision work. 3. Unique operation and controls that make possible high precision work with relatively little skill.



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The JIGMIL does most production boring and milling work faster and more accurately with rugged tools working in the open than is possible with the part trapped inside the walls of a boring fixture.

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for BAR *or* CHUCKING { UNIVERSAL or PLAIN

3 UNIVERSAL

For bar stock up to 1½" in diameter
10" turning length
16½" swing over bed
Infinite spindle speeds: 55 to 1800 RPM. constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 727A

2 PLAIN-GEARED

For bar stock up to 1" in diameter
Turning length 6½"
Swing over cross slide 6"
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Infinite spindle speeds:
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Constant horsepower at all speeds.
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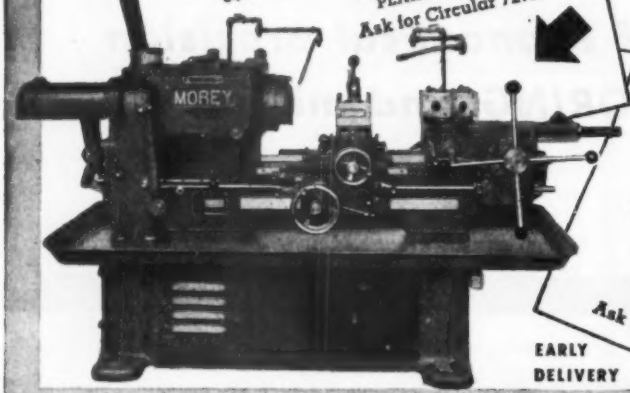

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- SPINDLE SPEEDS AND POWER FEED CHANGES WITHIN EASY REACH OF OPERATOR.

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THE DESIGN OF THE MOREY No. 2, 3 and 4 TURRET LATHES ARE BASICALLY ALIKE. EACH MACHINE IS ENGINEERED FOR THE SIZE WORK IT IS DESIGNED TO HANDLE.

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By "rigid" we mean minimum vibration, no backlash in quill travel, smooth, grease-sealed bearing operation.

By "fast" we mean 8 spindle speeds to 4250 r.p.m. . . . plus easy set-up . . . plus quick changeover for successive jobs.

All the small fussy work . . . die making, models, metal patterns, jig boring, fixtures, milling, reaming, may be quickly and profitably performed without tying up heavier, most costly equipment.

Moreover, the Linley is highly accurate . . . and built to withstand constant service.

BULLETIN ON REQUEST

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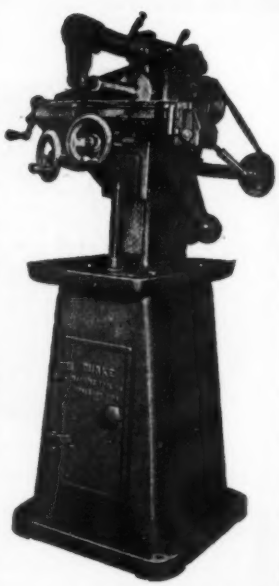
BURKE MILLING MACHINES

. . . Put Your Small Work on a Production Basis!



Those small, difficult jobs can be handled on a *production basis* with BURKE Motor Driven Milling Machines Nos. 1, 2, 3, & 4. Primarily, this is because BURKES have been *specially designed and built* to do smaller milling jobs efficiently and economically.

Then, too, a number of attachments are available . . . attachments that increase the units usability, and add to your productivity. These include a vertical milling attachment, index centers, and vises—3 types, including swivel base. Now, when production must be stepped up, is the time to investigate the profit possibilities of BURKE Milling Machines, as applied to your work.

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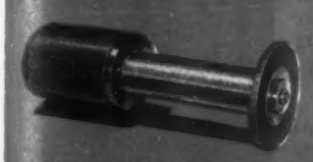
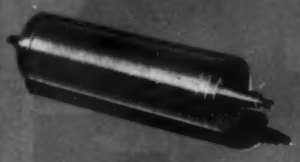


This POPE Sealed Motorized Spindle is ideal for all makes of 6" x 18" Surface Grinders. Equipped with *Sealed in* G-E motor and SKF Super-Precision Double Row roller bearings with sealed lubrication. Finer finishes and lasting dependability are assured.

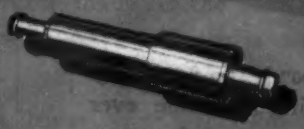


This POPE Tool and Cutter Grinder Spindle is a complete, self-contained package — sealed lubrication, cool running, long lived, requiring no attention.

This POPE Vertical Motorized Surface Grinder Spindle comes in a large range of HP. and RPM.

This POPE Spindle is of the cartridge type, flange mounted in a heavy housing. It is used as a headstock on special purpose, high production lathes.

This POPE Precision Spindle, mounted in a dovetailed base bracket, is used for winding glass thread. Operation calls for 24-hour-a-day performance with start and stop every 7 minutes — a stern test of spindle stamina.



This POPE Spindle is a trouble-free replacement spindle for converting old type cylindrical grinders into useful production machines.

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It's Your Move

Pick the winner for *your* job — then put it up to POPE, the Precision Spindle Specialists.

Send us a sketch or brief description of the spindle you want, with dimensions, and give us a rough idea of the machine, the method of holding wheel or tool, the speed, etc. Then we'll send you a Data Sheet that makes it easy for you to fill in the details. Once we have that, we can give you dependable recommendations with prices and delivery dates.

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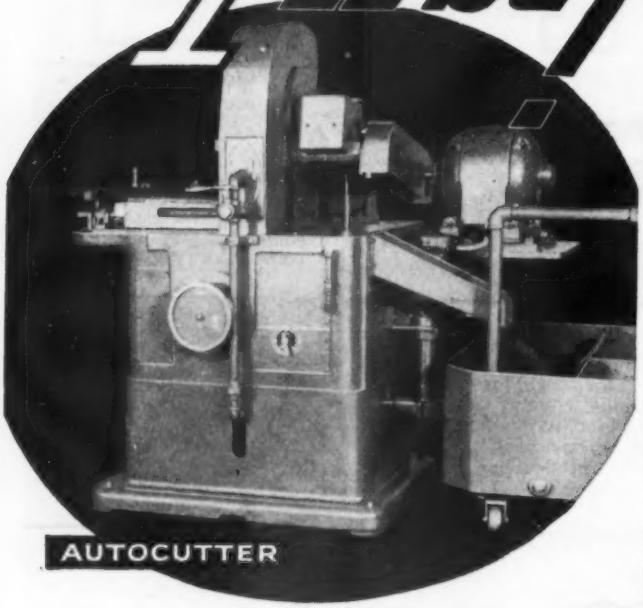
BUILDERS OF PRECISION SPINDLES

IT'S A *First*



AUTOCUTTER

Yes, this **CAMPBELL "MODEL 700"** is the first *fully automatic* abrasive cutting machine ever built. Coming from **CAMPBELL**, manufacturers of the most complete range of abrasive cutters, that's big news.

This "700" is "first" another way. It is the opening announcement of **CAMPBELL'S** post-war program of development, based on wartime improvements all through the line. Other announcements will follow.

Maybe there's a way a **CAMPBELL ABRASIVE CUTTER** could speed up or economize your production. It's easy to find out.

WHY NOT DO THIS?

Write and tell us (1) the range of sizes, (2) kind of material, (3) length of cutoff pieces, (4) length of stock before cutting, (5) tolerance for length of cut pieces and (6) hourly production requirement. With this information, **CAMPBELL** engineers can recommend production procedure and work up cost sheets for you.

Campbell

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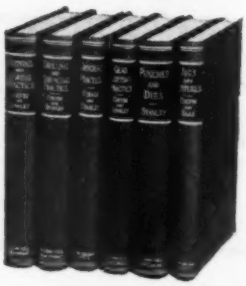

Few men deliberately plan to work persistently on self-improvement. If progress comes naturally, they are happy; if it does not, they either worry or they entirely ignore the situation.

Yet it is possible to pay attention to self-improvement with considerable hope of success. A noticeable degree of advancement is practically *assured* to anyone who will make an intelligent and persistent effort.

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—training in the various operations performed in drilling and surfacing materials in the machine shop

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Let air under pressure into the rubber-and-fabric gland, and the clutch engages. Let the air out and it disengages. You can have as light, or as firm, a grip as the job requires.

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Power controlled by air! Power controlled without springs, arms or levers, requires no lubrication, needs no adjustments!

The same clutch has been engineered for industrial use in heavy-duty service—with performance records matching those made on the sea.

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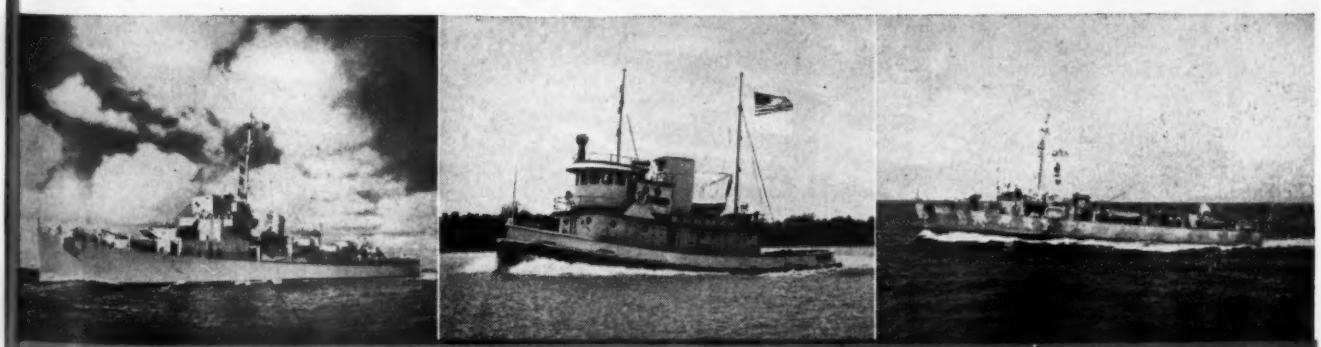
Drags and Cranes	**Oil Field Drives**
Paper Mills	**Sugar Mills**
Steel Mills	**Power Shovels**

Our Engineering Department will gladly give you complete data, and recommendations based on experience.

FAWICK AIRFLEX COMPANY, INC.
9919 Clinton Rd. • Cleveland 11, Ohio
In Canada, **Renold-Coventry Ltd., Montreal, Toronto, Vancouver**
In Britain, **Crofts Engineers, Ltd., Bradford, England**



FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR

New Year's Resolution:

WHEREAS: The year 1944 has witnessed a supreme achievement of American machine tools, in winning "the Battle of Production."

Now Therefore be it Resolved: That the AXELSON HEAVY-DUTY LATHE has won a commanding place amongst the machine equipment vital to Victory; And be it further resolved that the capacity, precision, lasting qualities, versatility and speed of this great lathe as a war production machine, now stand ready to be transposed to the needs of Peace and Reconstruction: And that, backed by over thirty years of constant improvement, the Axelson Lathe confidently makes its claim upon the considerations of machine tool users everywhere.

AXELSON MANUFACTURING COMPANY
6160 So. Boyle Ave. (Box 98, Vernon Station), Los Angeles 11, Calif. • 50 Church St., New York City 7 • 3844 Walsh Street, St. Louis, Missouri

Axelson Lathes, of various lengths, are manufactured in 14, 16, 18, 20, 25 and 32-inch sizes

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON LATHES

Dependable for over a Quarter Century

BUY WAR BONDS!

Proved in War use—

There's a

GULF QUALITY RUST PREVENTIVE

for each specific need!

Available now for protecting your surplus equipment

Every type specially suited to provide maximum protection

When you change over from swords to plow shares, make sure your surplus tools and equipment are properly protected against damaging rust.

From Gulf's complete line, you can select one or more war-proven rust preventives that will meet your every requirement for both interior and exterior use—and provide positive protection for indefinite periods.

Gulf quality rust preventives have given an excellent account of themselves in protecting all types of metal parts and war equipment during storage and transportation overseas. They meet Government specifications for exterior and interior application, and are available now for immediate delivery.

For further information on Gulf quality rust preventives, write, wire, or phone your nearest Gulf office.

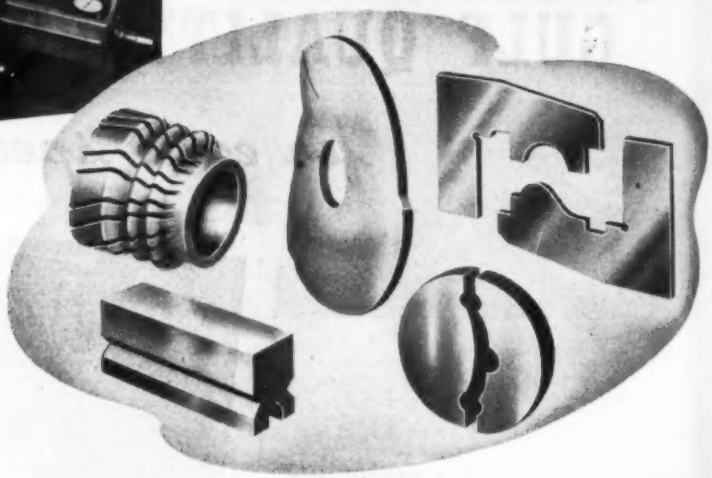
Gulf Oil Corporation • Gulf Refining Company

GULF INDUSTRIAL LUBRICATION

Division Sales Offices:
Boston • New York • Philadelphia • Pittsburgh • Atlanta
New Orleans • Houston • Louisville • Toledo

This Versatile Grinder

WILL SAVE TIME ON MANY TOOL ROOM OPERATIONS



SAVE UP TO 75% ON

- Flat Form Tools
- Circular Form Tools
- Wheel Crusher Rolls
- Templates
- Profile Gages
- Cams
- Die Blocks
- Jig and Fixture Parts
- Ground Forms Of All Kinds

The Wickman Profile Grinder can be one of the most useful and easiest-to-use machines in any tool room. It will grind both positive and negative rake and clearance angles without attachments. Several thin pieces can be clamped together and ground at one time. Circular forms can be ground with the addition of a simple attachment for holding the work. Since the wheel need not be form dressed even for the most complicated contours and set-up is so simple, the Wickman Profile Grinder is very easy to change from one job to another.

The Wickman Profile Grinder will save you many hours and many dollars on every precision profile grinding job. Write today for full information on this useful machine and the work that it will do.

BUY MORE WAR BONDS

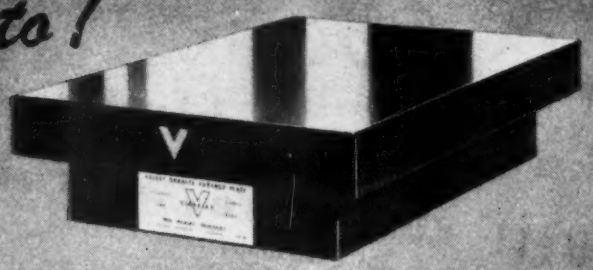
PIONEERS OF OPTICAL FORM GRINDING

THE Wickman CORPORATION

15539 WOODROW WILSON AVE.
DETROIT 3, MICHIGAN

To You from Pluto!

BLACK GRANITE SURFACE PLATES LAPPED TO .00005" ACCURACY



Many million years ago . . . down deep below the earth's surface in what the ancients termed the Plutonic Regions . . . feldspar, quartz, and mica were fused in a molten mass. The magma cooled very slowly under tremendous pressure, allowing ample time for large crystals to form. Subsequent earthquakes heaved up great bodies of the granite in various locations.

A Sculptor's Idea

The idea of using black granite for surface plates was conceived by a sculptor. He saw in it unequalled advantages for the purpose—capability of taking a fine finish; molecular stability; superior hardness; availability in large dimensions. His experiments showed that slabs of granite can be lapped together in series to a surface flatness of fifty millionths of an inch tolerance.

That is how Velsey Surface Plates originated. They are the most permanently accurate surface plates produced today. They are free from internal stresses and strains because their structure was stabilized by nature in long past ages. Their infinitesimal surface tolerances cannot be changed by shock or extremes of temperature.

"Hard as Granite"

Black granite is harder than tool steel; therefore virtually impervious to scratches. Even though a dent in the face were caused by a hammer blow, the adjacent surface would not be upset.

Velsey Surface Plates are non-freezing, non-magnetic, non-abrasive. They are rust-proof, warp-proof, shock-proof. They are enduringly flat.

A wide range of sizes is available—12" x 18", 18" x 24", and 24" x 36" being standard. Other sizes can be furnished on special order.

For reasons of unfailing accuracy and economy, Velsey Surface Plates are replacing others in many plants. This is natural when the virtues of Velseys are known by actual usage. Ownership of a Velsey Surface Plate will convince you, too, of its outstanding advantages.

Metal stands with ball-bearing casters are available for moving Velsey Surface Plates. Rigid construction. Roomy drawers for instruments. Practical because rolling over the roughest terrain cannot injure or distort Velsey Surface Plates.

STATE MANUFACTURING & CONSTRUCTION CO.

Franklin, Ohio

VELSEY SURFACE PLATES

STATE

STATE MFG. & CONSTRUCTION CO.,
FRANKLIN, OHIO

Send catalog illustrating and pricing VELSEY Plates and STATE Four-Cutter and Precision Jig Boring Tools.

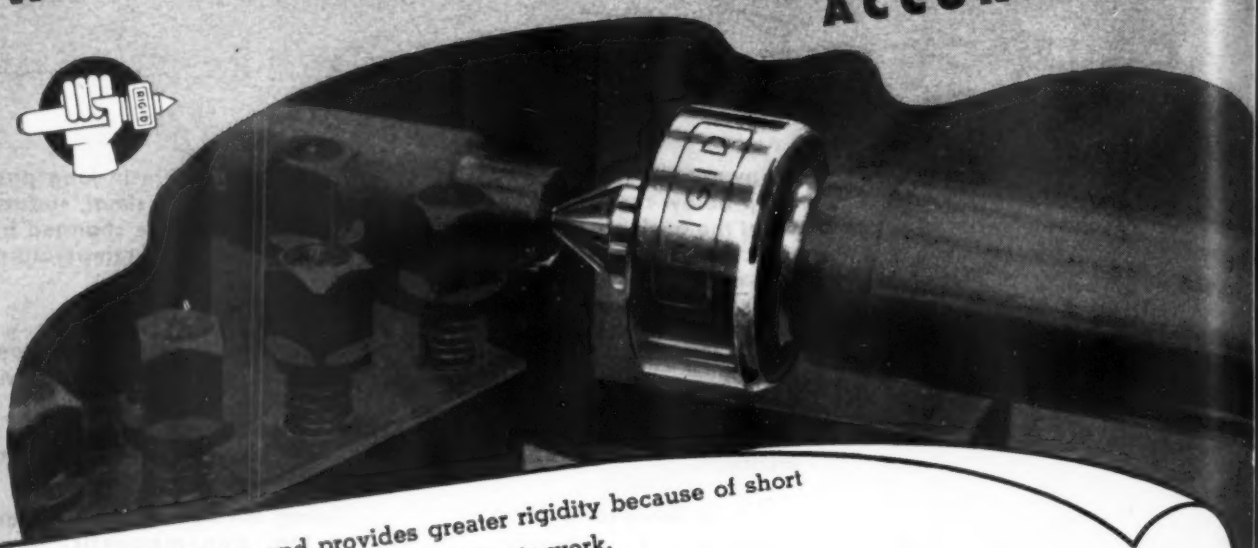
Individual

Company

Address

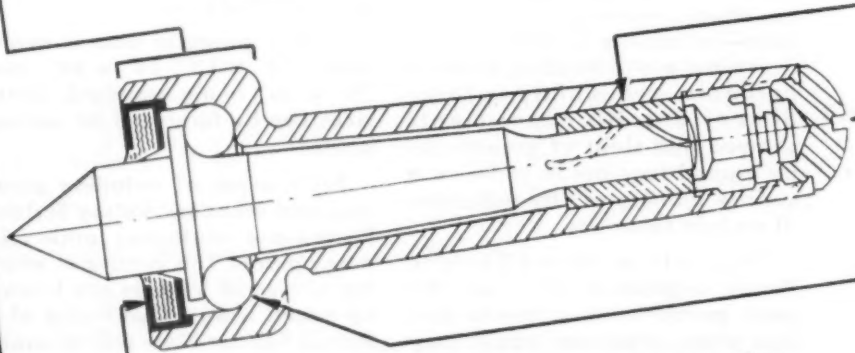
City and State

THE *Live* CENTER that will not bind—even with heavy loads Will run true, within .0002 ACCURACY



Eliminates vibration and provides greater rigidity because of short overhang. Can get closer to work.

Built with Oilite bearing.



Zerk fitting facilitates greasing without disassembly.

Housing forms its own ball race, thereby eliminating many parts, and makes for greater accuracy and resiliency.

Rawhide seal retains lubricant and prevents foreign matter from getting inside.

EMPIRE TOOL COMPANY

Exclusive Distributors

8774 GRINNELL AVENUE • DETROIT 13, MICH.

Also manufacturers of Empire Floating Tool Holders and Luers Patented Cutting-Off Blades and Holders and distributors of Fastcut Centerdrills and Keyseat Cutters.

The Rigid Live Center stays true—wears well—and proves its exceptionally high quality on work that demands close tolerances.

Because of its simple construction (it has fewer parts than any other live center on the market) and because its lubricating system contributes to a low friction factor (grease does not leak out), the Rigid Live Center is accepted by leading industries as one of the best in the field.

BUY WAR BONDS

TWO LINES THAT "Fit"

WAREHOUSES
15 WARREN STREET
NEW YORK
611 W WASHINGTON
BOULEVARD
CHICAGO
641 SO SAN PEDRO ST
LOS ANGELES

CABLE ADDRESS
"GETEDE"
GREENFIELD MASS
U S A

BRANCH FACTORY
5850 SECOND BOULEVARD
DETROIT

GREENFIELD TAP AND DIE CORPORATION

TAPS, DIES, GAGES, SCREW PLATES, TWIST DRILLS, REAMERS, PIPE TOOLS,
GREENFIELD, MASSACHUSETTS
UNITED STATES OF AMERICA

TO OUR CUSTOMERS:

Final arrangements for the purchase by the Greenfield Tap and Die Corporation of The Geometric Tool Company of New Haven, Connecticut, have been completed.

The acquisition of this nationally known firm of precision tool-makers will broaden the base of Greenfield's service to industry -- in research, screw thread engineering, and in the production and distribution of a complete line of precision threading tools and gages.

The Geometric Tool Company, as you may know, makes self-opening die heads, chasers, collapsing and adjustable taps, chaser grinding fixtures and threading machines. Its experience fits in ideally with our own knowledge of cutting tools and gages.

We plan to operate The Geometric Tool Company as a division of the Greenfield Tap and Die Corporation, pooling our engineering and manufacturing experience to provide better threading tools and screw thread service than ever before.

Very truly yours,

GREENFIELD TAP AND DIE CORPORATION

D. G. Millar

President

D.G.Millar-M

ARMY ★★ NAVY

GTD GREENFIELD

GREENFIELD TAP and DIE CORPORATION
Greenfield, Massachusetts

ARMY ★★ NAVY

GEO MET RIC

GEOMETRIC

THE GEOMETRIC TOOL COMPANY
New Haven, Connecticut

HIS "LOOT" is a BILLION A YEAR!

Stop that thieving demon RUST with new

SHELL RUST-PREVENTIVES

WHAT IS RUST'S annual "cut" in your business? How much should you charge off to this thievery?

Probably much more than you think!

Because the cost of rust is the total of a lot of big and little losses. Depreciating equipment . . . ruined materials . . . worthless finished products. *Plus time wasted all along the line!*

That is no new story. *The news is that Shell has perfected and now presents a complete line of Rust Preventives* . . . the new Shell Ensis Rust Preventives for coating metals . . . the new Shell Tellus Oils for lubrication.

Shell Ensis Rust Preventives embody a complete line of oils, fluids and compounds. They are available in various grades and provide protection against the dangers of exposure. Their protective coatings range from thin, transparent films for indoor use to heavy, abrasion-and-weather-resistant coatings for outdoors.

Shell Tellus Oils do not *remove* rust . . . However, where moisture is a factor, special rust-inhibiting qualities built into them afford protection against the formation of rust, without sacrifice of other valuable characteristics.

Call in the Shell Man. Let him make a study of your operation, and advise you the proper Rust Preventive product to "stop the thieving demon in your plant." Write, wire or phone Shell Oil Co. Inc., 50 W. 50th St., New York 20, N. Y. . . . or 100 Bush St., San Francisco 6, Calif.

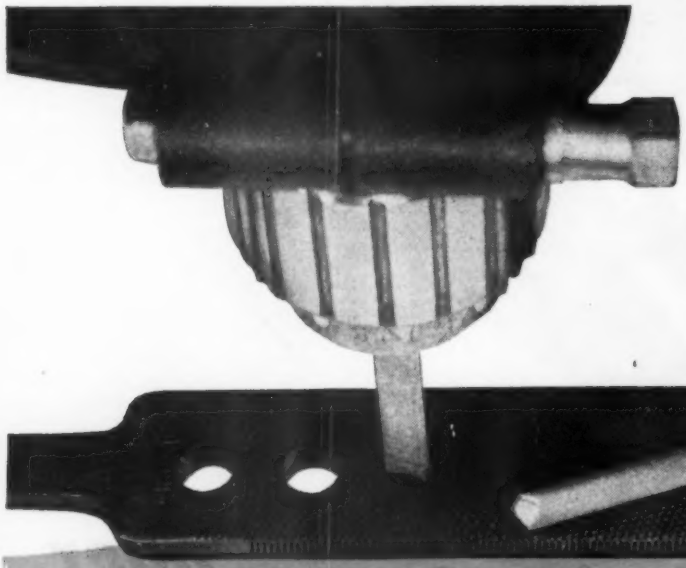
SHELL Ensis Rust Preventive Coatings

SHELL Tellus Rust Preventive Lubricating Oils

SHELL

"HARDSTEEL"

THE DRILL THAT AMAZED THOUSANDS AT THE METAL CONGRESS SHOW DRILLING FILES



During the last few years, "HARDSTEEL" drills have amazed thousands in industry too—drilling, countersinking and counterboring hardened steels with the same facility that high speed twist drills exhibit on ordinary steel. Useful alike on production and parts recovery operations.

YOU HARDEN IT—WE'LL DRILL IT

Write for free copy of "HARDSTEEL" OPERATOR'S MANUAL.

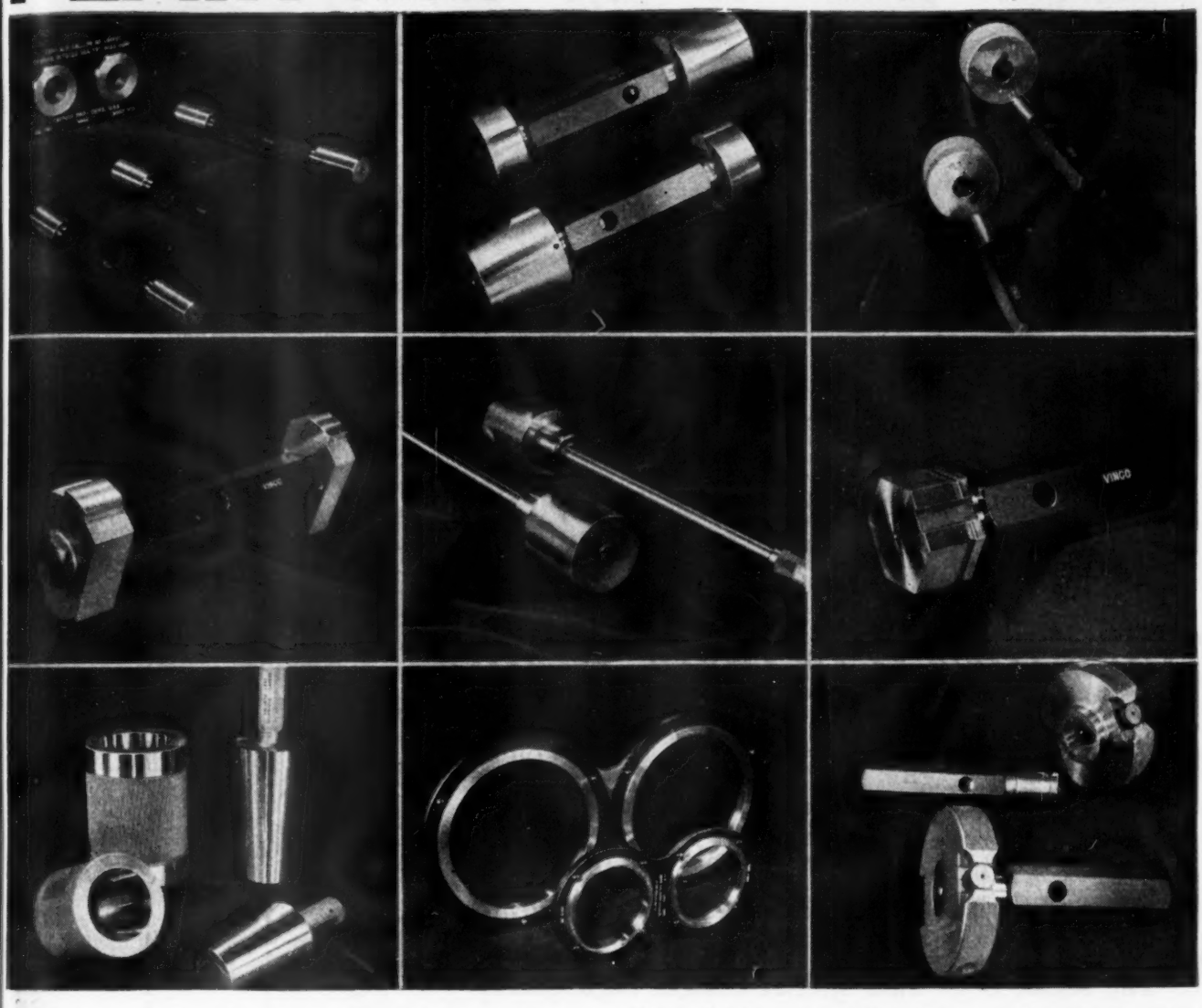
Also inquire about "HARDSTEEL" as a metal. Many manufacturers are finding it ideal for special parts that must meet unusual conditions of service.

"HARDSTEEL"

DRILLS • TOOL BITS • SPECIALS

BLACK DRILL CO. • Division of Black Industries • 1400 E. 222nd St., Cleveland 17, Ohio

PLAIN GAGES—BUT OF VINCO QUALITY



Simplicity of design plus a great demand have encouraged many gage shops to bid for this type of gage work without having sufficient skill and knowledge to produce the perfection required for constant, accurate gaging. A plain cylindrical gage must not only be accurate but have a hard, durable surface, smooth enough to satisfy the microscopic scrutiny of the surface analyzer. To grind the plug blank down to the required size and still maintain enough lap stock so the minute grind ridges can be lapped to this required smoothness involves a technique that is not learned over-night, a "know-how" that is developed only after long experience. That is the way *WE* make them—so if you are in the market for a plain cylindrical plug that is both durable and accurate, the best suggestion we can make is—Buy VINCO.

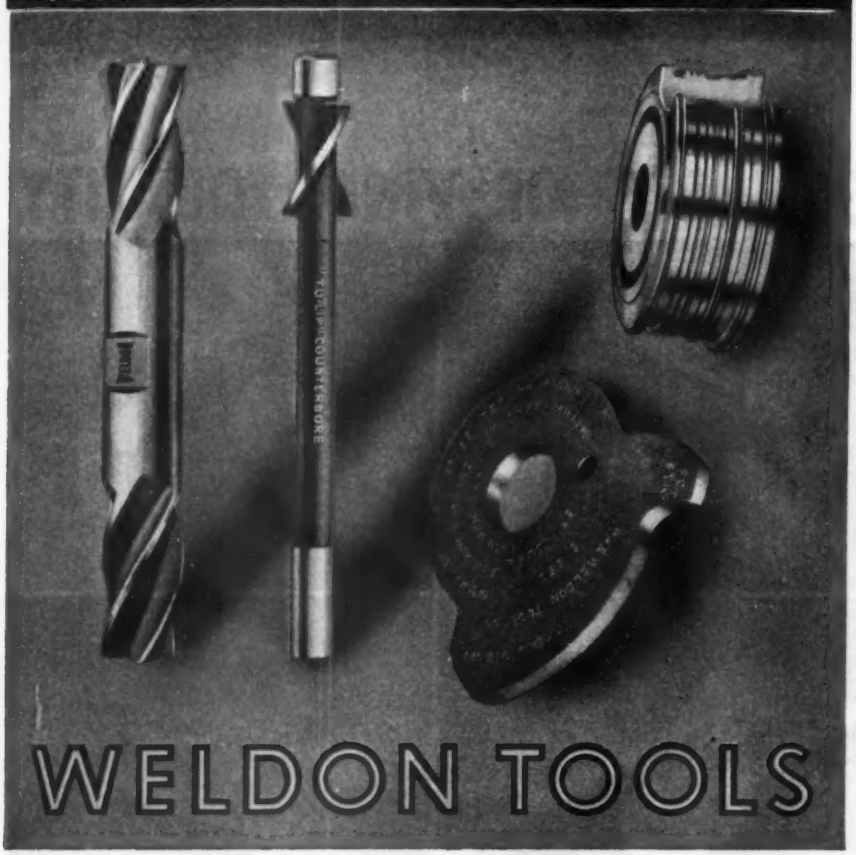
VINCO CORPORATION, 8851 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN. SALES OFFICES: NEW YORK, CHICAGO, CLEVELAND

MILLIONTHS OF AN INCH FOR SALE BY VINCO

REG. U. S. PAT. OFF.

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power, Control, Utilization and Distribution Units • Engineering, Design and Development.

YESTERDAY'S PIONEER • • • TODAY'S LEADER



They take it in their Stride

WELDON Tools are built for tough going. Where production requirements call for a combination of high speed and fast feed with heavy strain *WELDON Tools take it in their stride.*

The secret is in their special design, high quality material, fine workmanship and rigid inspection.

Let us help you on your cutting tool problems.

WRITE FOR CATALOG 8-B

THE WELDON TOOL CO. Cleveland 4, Ohio

3000 WOODHILL ROAD

CARBIDE TIPPED SOLID TYPE CHUCKING REAMERS

STRAIGHT SHANK

SIZE	OVERALL LENGTH	NO. OF FLUTES	NET PRICE
3/16	4½	4	$10.00
7/32	5	4	10.00
1/4	6	4	8.00
9/32	6	4	8.50
5/16	6	4	8.50
11/32	7	4	9.00
3/8	7	6	9.00
13/32	7	6	9.50
7/16	7	6	9.50
15/32	8	6	10.00
1/2	8	6	10.00
17/32	8	6	10.50
9/16	8	6	10.50
19/32	9	6	11.00
5/8	9	6	11.00
21/32	9	6	11.50
11/16	9	6	11.50
23/32	9½	6	12.00
3/4	9½	6	12.00
25/32	9½	6	12.50
13/16	9½	6	12.50
27/32	10	6	13.00
7/8	10	6	13.00
29/32	10	8	13.50
15/16	10	8	13.50
31/32	10½	8	14.00
1	10½	8	14.00

MORSE TAPER SHANK

SIZE	OVERALL LENGTH	MORSE TAPER	NET PRICE
1/4	6	1	$9.00
9/32	6	1	9.50
5/16	6	1	9.50
11/32	7	1	10.00
3/8	7	1	10.00
13/32	7	1	10.50
7/16	7	1	10.50
15/32	8	1	11.00
1/2	8	1	11.00
17/32	8	1	11.50
9/16	8	1	11.50
19/32	9	2	12.00
5/8	9	2	12.00
21/32	9	2	12.50
11/16	9	2	12.50
23/32	9½	2	13.00
3/4	9½	2	13.00
25/32	9½	2	13.50
13/16	9½	2	13.50
27/32	10	2	14.00
7/8	10	2	14.00
29/32	10	3	14.50
15/16	10	3	14.50
31/32	10½	3	15.00
1	10½	3	15.00

Number of Flutes Same for M.T. as on S.S. for Identical Sizes

Bronx Hardware & Supply Co., Inc.
2735 Third Avenue • New York 51, N.Y.

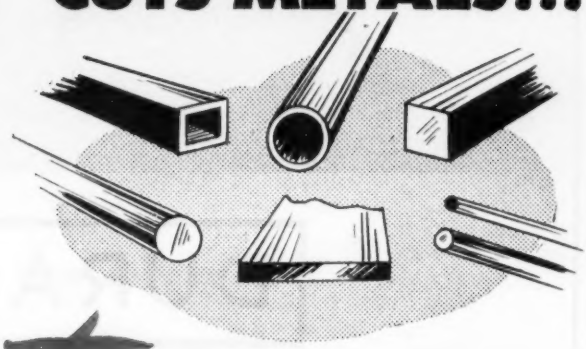
MACHINE TOOLS • CUTTING TOOLS
FACTORY EQUIPMENT • ACCESSORIES

Wells No. 8

SPECIFICATIONS
WELLS No. 8

CAPACITY: Rectangular . 8"x16"
(Special Guides) . . 5" x 24"
ROUNDS: . . . 8" diameter
MOTOR: . . . . . ½ H. P., current optional
SPEEDS: . Selective 60, 90, 130 feet per minute
WEIGHT: . . . . Approximately 750 pounds

CUTS METALS...



CUTS *Costs* TOO!

There's no doubt about it. For economical metal cutting, this Wells No. 8 is hard to beat. Because of its flexibility you can use it for your odd cutting jobs and free large production units for other work.

It cuts quickly, and with a minimum of labor. The quick acting vise handles odd shapes without special fixtures. It's accurate. And, it affords a substantial material saving as the saw removes only 45 thousandths of an inch of material.

Another reason why the Wells cuts costs is its portability. You save time and labor by moving the saw to the work.

Thousands of Wells Metal Cutting Band Saws are working in busy plants. Check up. You'll find a spot in *your* plant for a Wells No. 8.

Wells SAWS
THE SIGN OF SERVICE

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
505 ROOSEVELT ROAD, THREE RIVERS, MICH.

NORTON ABRASIVES

DURABONDED
TRADE MARK

This Startling Improvement in Coated Abrasives Gives

LONGER, COOLER CUTTING LIFE

The latest Behr-Manning development, which hardens the adhesive bond, makes our metal sanding abrasives . . .

More resistant to heat – Less sensitive to humidity

A bond that resists heat gives more rigid support to the millions of cutting grains and also greatly retards any tendency to "load."

A bond less sensitive to humidity—whether the latter be in the material sanded, in the surrounding atmosphere, or both—extends cutting action for a longer time.

"DURABONDED" Coated Abrasives bring you both these advantages.

Reports from hundreds of metal sanding operations in the field—on high speed belts, discs and "gadgets"—show an average of 20% increase in cutting life at no advance in price.

If you have not tried "DURABONDED" abrasives, use the coupon.

BEHR-MANNING, TROY, N. Y.
We would like to know more about "DURABONDED" Coated Abrasives.

Firm Name .....
Street .....
City ..... **Zone** ..... **State** .....
By ..... **Title** .....

BEHR-MANNING
(DIVISION OF NORTON COMPANY)
TROY, N. Y.
Reliable Coated Abrasives Since 1872

Vital to the World's Heavy Hauling Jobs

The automotive industry has achieved low costs by mass production.

It has achieved mass production through the interchangeability of parts.

Parts, to be interchangeable, must be machined to exact dimensions.

The automotive industry, since its beginning, has specified and used in ever increasing quantities, Shield Brand Drills, Reamers, Taps, Dies and Cutters. Today it is one of our largest customers.

If you are seeking to achieve lower costs and faster, better production, perhaps the experience of the automotive makers with Shield Brand Products will recommend them to you. At least, consult our engineers on your tough problems. Of course, there is no obligation. Write to

THE STANDARD TOOL CO.

CLEVELAND

New York Store
94 Reade Street

Detroit Store
6553 Hamilton Ave.

Chicago Store
552 W. Washington Blvd.

STANDARDIZE

for

UNINTERRUPTED PRODUCTION

The maintenance of uninterrupted production on all metal cutting machines in all departments is important in achieving lower costs.

It is only when metal cutting tools of all classes are uniform in construction and performance that management can establish uniform standards for all machine operations, and workmen can carry them out.

Standard Shield Brand Drills, Reamers, Taps, Dies and Cutters are uniform because produced by a single responsible maker, in a single plant, to only one standard—the highest possible quality.

By Standardizing on Shield Brand Tools of the classes shown you will get uniform performance on all metal cutting operations–result, fewer production interruptions and lower costs.

Leading mill supply dealers from coast to coast can furnish these Standard Tools. Your inquiries will receive prompt attention.

THE STANDARD TOOL CO.

CLEVELAND

New York Store
94 Reade Street

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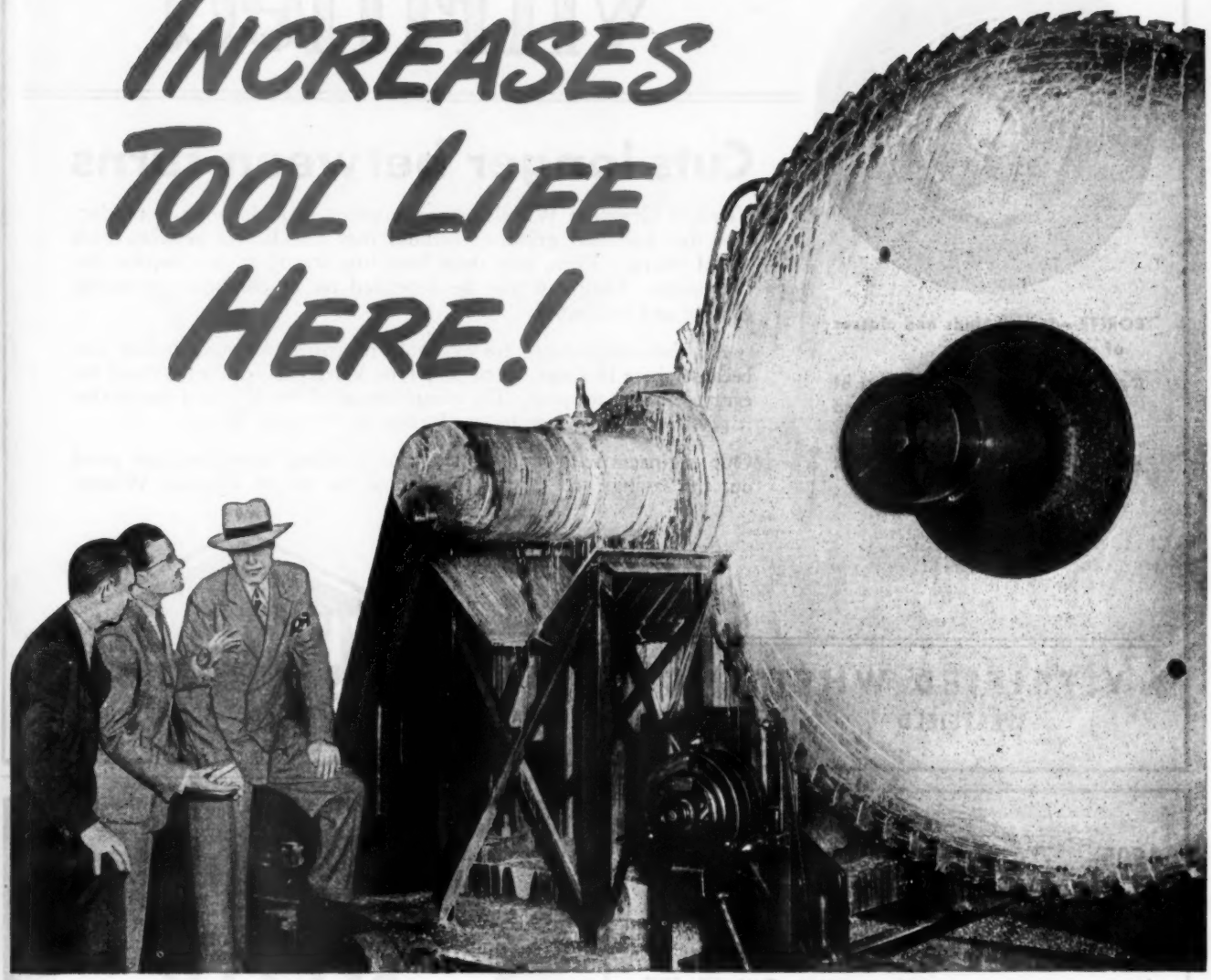
New S/v Solvac Oil 410...

INCREASES TOOL LIFE HERE!



HEAVY-DUTY cutting operations, such as this shaft-sawing job, impose tremendous pressures on cutting tools. The big problem for a cutting fluid is to protect the cutting edges from wear, chipping and breakage.

To meet this problem, Socony-Vacuum has developed a vastly improved non-gumming heavy-duty soluble oil. The new oil has been named S/V Solvac Oil 410.

This new oil, now in use in many shops, provides far greater pressure resistance and anti-weld properties than preceding heavy-duty oils. Yes, and these improvements were added without any sacrifice in lubricity characteristics.

The result is an ideal soluble oil for heavy-duty cutting. Ask your Socony-Vacuum representative for performance facts and figures on S/V Solvac Oil 410.

SOCONY-VACUUM OIL CO., INC.
Standard Oil of N. Y. Div. · White Star Div. · Lubrite Div. · Chicago Div. · White Eagle Div. · Wadhams Div. · Magnolia Petroleum Co. · General Petroleum Corporation of California.

CALL IN SOCONY-VACUUM FOR "CORRECT LUBRICATION"

Socony-Vacuum's FIVE STEPS to Lower Production Costs for You

1. Lubrication Study of Your Entire Plant
2. Lubrication Schedules and Controls
3. Lubricant Storage and Handling System
4. Skilled Engineering Counsel
5. Progress Reports of Benefits Secured

GARGOYLE Lubricants

Vitrified

Cuts longer between turns

Vitrified Grinding Wheels assure economy in high quantity production fine precision grinding because they cut longer between each wheel truing. Then, too, these long life, strong wheels require less redressing. They can also be depended on to eliminate gumming, glazing and heating.

All these advantages are available regardless of the grinding job, because there is a size, shape and type Vitrified Grinding Wheel for every grinding purpose. The completeness of the Vitrified line makes it possible for any shop to standardize on Vitrified Wheels.

Our engineers will gladly study your grinding operations and point out the savings you can make through the use of Vitrified Wheels.

BORITE—for all kinds and classes of steel grinding.

CARBORITE—for all classes of cast iron, brass, bronze and aluminum grinding.

Also, Silicate, Shellac and Resinoid Bonded Wheels.

VITRIFIED

VITRIFIED WHEEL COMPANY
WESTFIELD MASS.

1905 **Strand** 1945

FLEXIBLE SHAFT MACHINES

ONE HUNDRED TWENTY FIVE TYPES AND SIZES
VERTICAL AND HORIZONTAL
MORE THAN THREE HUNDRED ATTACHMENTS.

Punch Upsetting Machine

Cap Setting Machine

To the left is shown our new machine used for the upsetting of punches in place and used extensively in the die and tool department of stamping plants. On the right is shown our new machine for cap setting up to 90 mm caps. Fully adjustable for torque. These machines obtainable in vertical and horizontal types ¼ H.P.

Send for our new 112 page Catalog No. 29

N. A. STRAND CO.
CHICAGO 40, ILL. 5001 NO. WOLCOTT AVE.

Darwin

NEOR

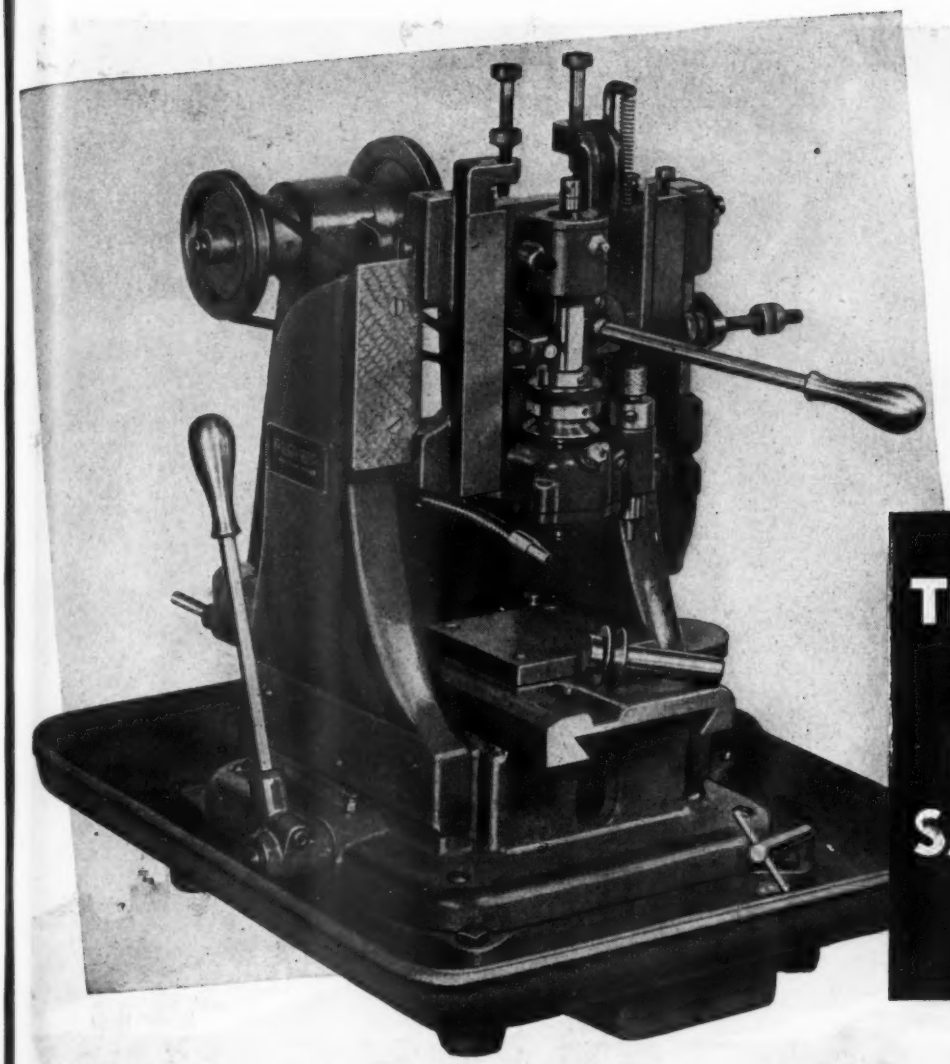
The Original Oil Hardening, Non - Deforming High Carbon - High Chrome Steel

NEOR is recognized as one of the finest high-carbon, high-chromium steels. For quantity production, NEOR is unsurpassed for dies. Retains a keen edge much longer than carbon or high speed steels. NEOR hardening penetrates to the center of the tool and is non-deforming.

Owing to its remarkable resistance to abrasion, NEOR is ideal for gages.

Furnished in Billets, Bar Stock and Drill Rod. Bulletin on Request.

DARWIN & MILNER Inc.
highest grade tool steels
1260 W. FOURTH ST. CLEVELAND 13, OHIO



THIS WADE BENCH PROFILER SAVES YOU MONEY

This Wade Motor Driven Bench Profiler saves you money because it enables you to produce small precision parts quickly and more accurately. With it you can do profiling, milling, slotting, recessing, and routing operations more efficiently and at a lower cost. You can handle a wide variety of small parts with this time-saving, money-saving Wade Profiler, and free larger machines for heavier work.

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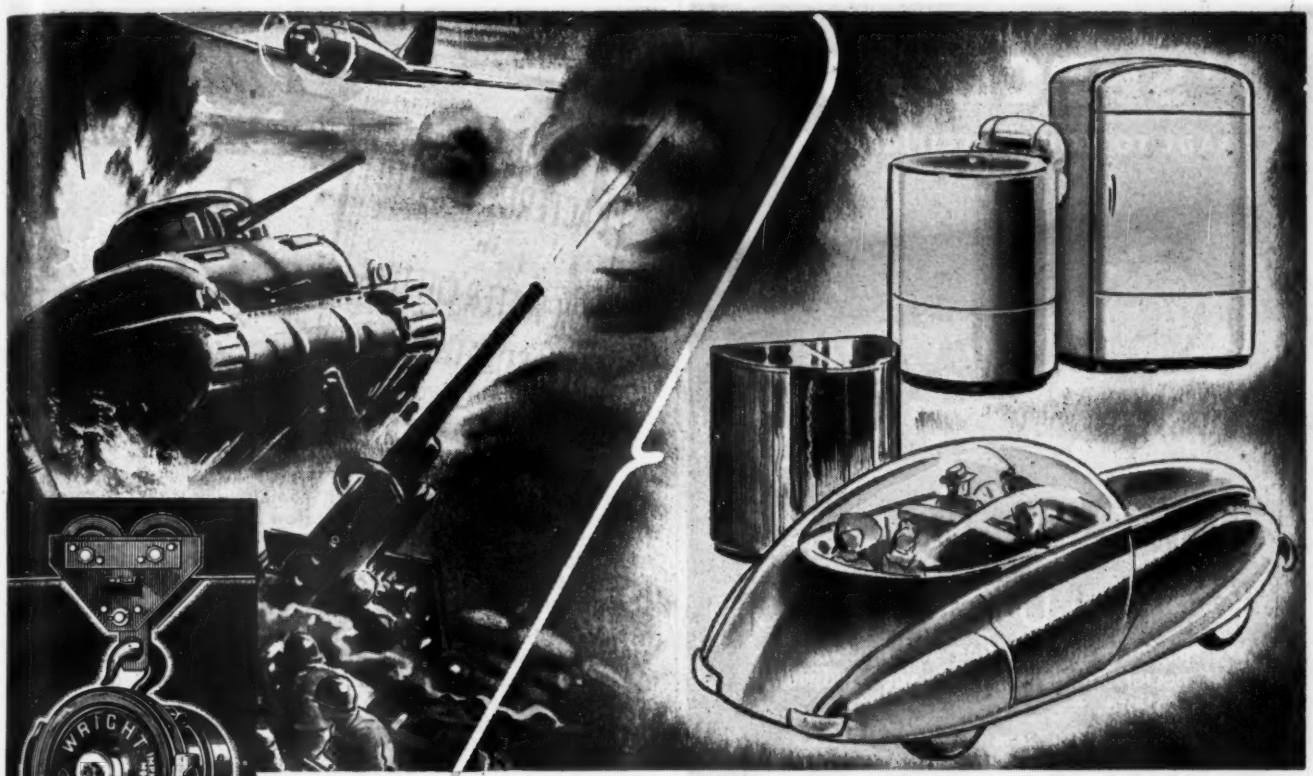

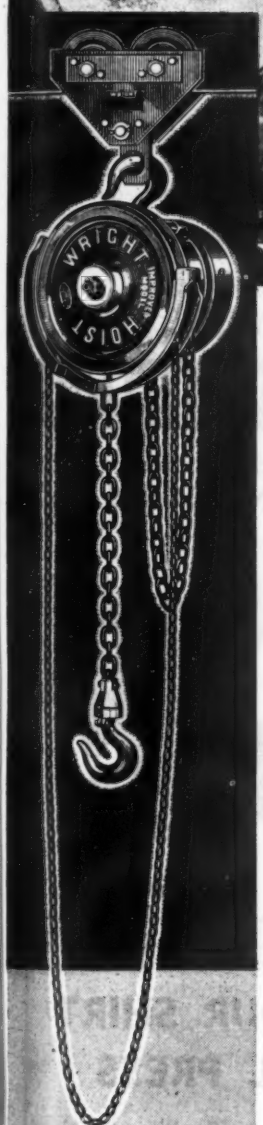

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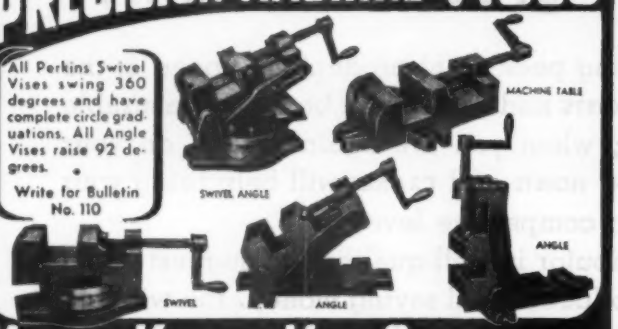

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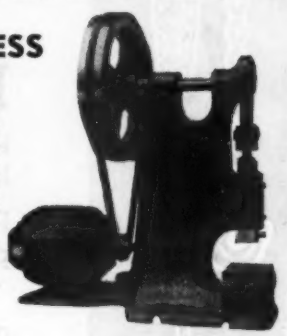

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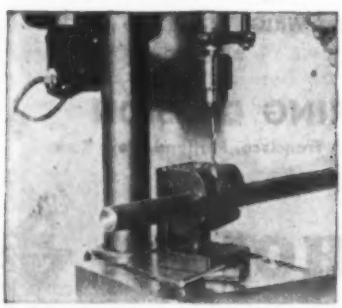

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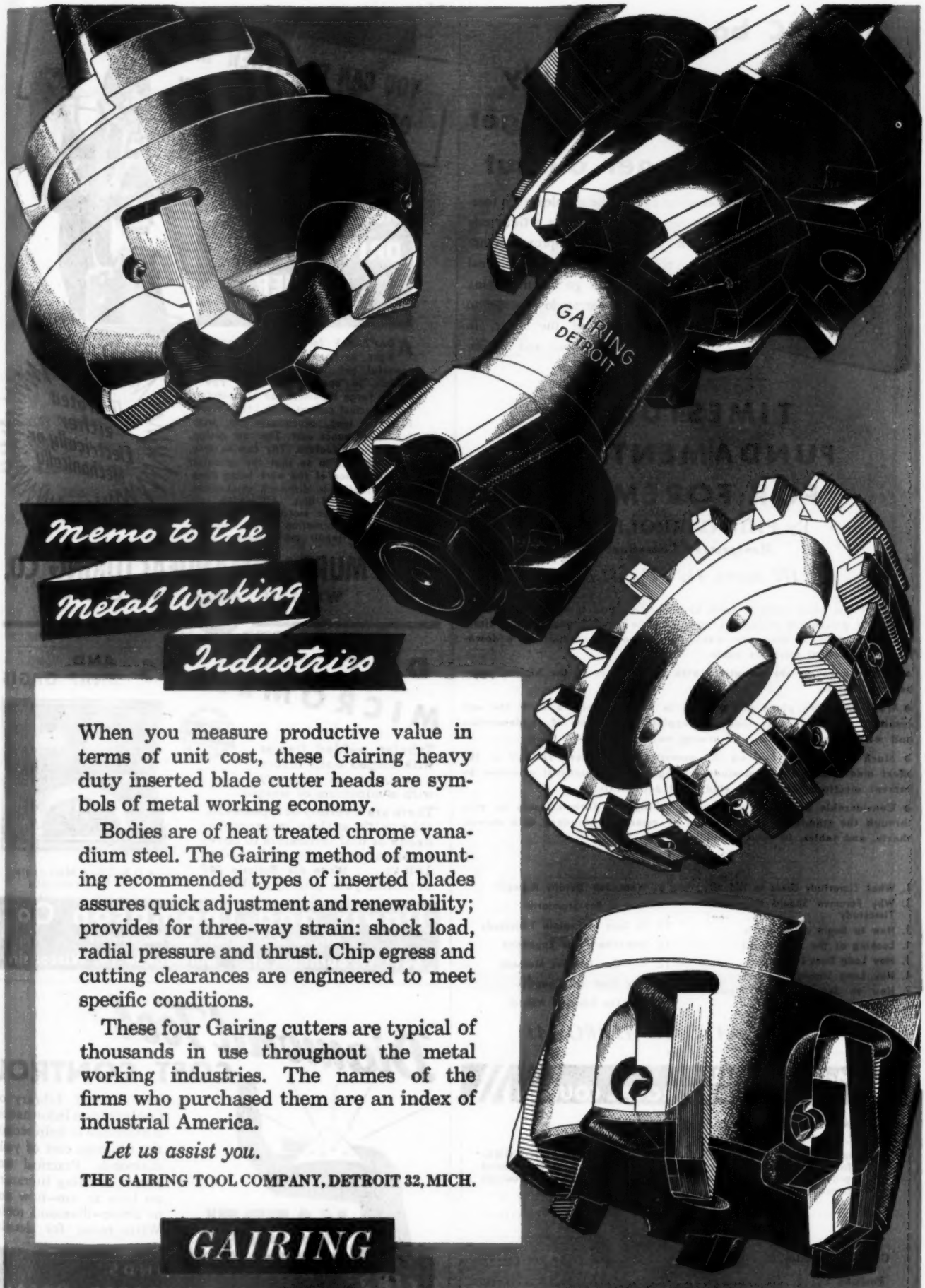

Memo to the Metal Working Industries

When you measure productive value in terms of unit cost, these Gairing heavy duty inserted blade cutter heads are symbols of metal working economy.

Bodies are of heat treated chrome vanadium steel. The Gairing method of mounting recommended types of inserted blades assures quick adjustment and renewability; provides for three-way strain: shock load, radial pressure and thrust. Chip egress and cutting clearances are engineered to meet specific conditions.

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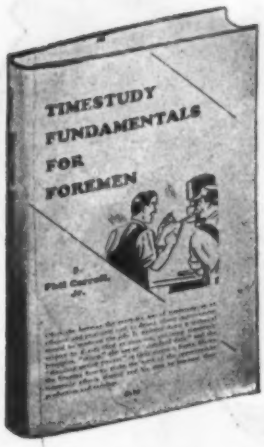
GAIRING

MANUFACTURERS OF STANDARD AND SPECIAL INSERTED BLADE CUTTING TOOLS

An ABC book of timestudy to help you get bigger output



Stressing exactly the problems the foreman encounters in making a timestudy and in applying new, improved standards, this straightforward manual shows just how to go about making the study, tells what to do in order to get the most out of the study, in bigger and better output and in improved working methods.

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Management Consultant

172 pages, 4¾ x 7⅜, $1.75

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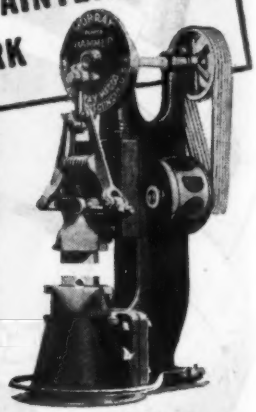

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No. 67 has a dual character. It's a shock-resisting steel, and it's widely used for master hobs; more than that, it is *equally suitable for both cold work and hot work.* Though cold-battering is one of its major applications, it is also employed extensively for such hot-work tools as headers, piercing punches, upset punches, gripper dies, shear blades, etc. Tools made of No. 67 Chisel Steel maintain their effectiveness in hot work until they have become heated to 1050 deg. F.

No. 67 is one of Bethlehem's Big 8 Tool Steels. Each of the Big 8 is a specialist; yet the range of usefulness of these versatile steels is so broad that they can be used for 97 per cent of all tool-room jobs—a list running into the hundreds of applications. If you haven't yet tried these tool steels—or if you feel you are overlooking some of their uses—a Bethlehem engineer will be glad to offer suggestions.

Some Facts about 67 CHISEL STEEL

Typical Analysis:

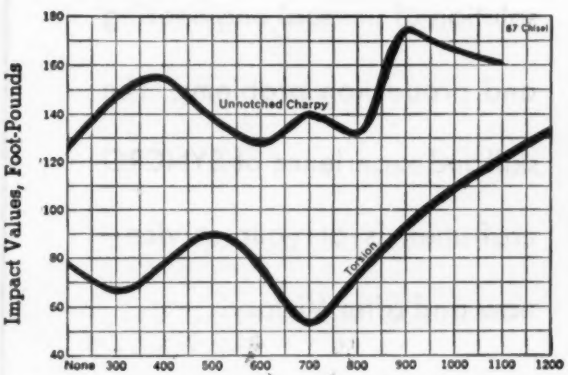
C.	Mn.	Si.	Cr.	V.	W.
0.50	0.25	0.85	1.15	0.20	2.50

Heat Treatment

Preheat to 1100-1300 deg. F.; then heat to 1700 deg. F. for oil-quenching, 1600 deg. F. for water-quenching. The resulting Rockwell C hardness will be about 55 and 57 respectively. The drawing temperatures vary with the intended uses.

Impact Values

The following graphs show the results of unnotched Charpy and torsion tests on standard-sized specimens of No. 67 Chisel Steel (oil-quenched from 1700 deg. F.):



the BIG 8

- CARBON TOOL STEEL
- TOOL ROOM
- OMEGA
- NO. 67 CHISEL
- AIR-HARDENING
- LEHIGH TOOL AND DIE, H TEMPER
- NO. 57 HOT WORK
- NO. 66 HIGH SPEED

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
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NO. 67 CHISEL . . . one of Bethlehem's BIG 8 Tool Steels

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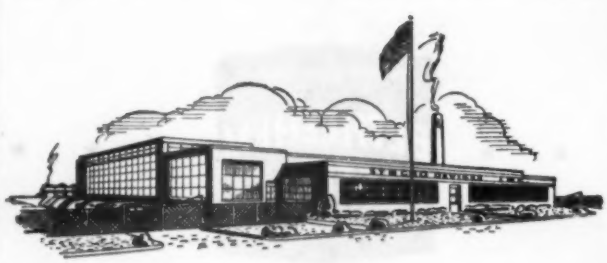

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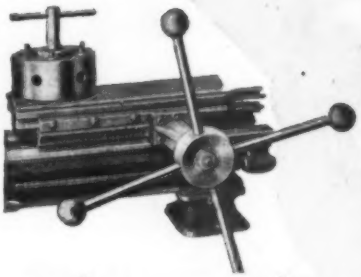

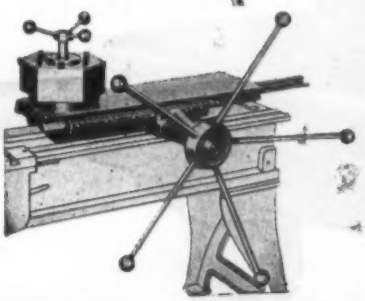

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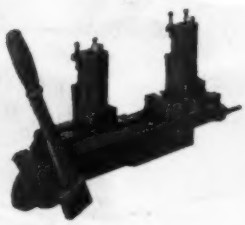

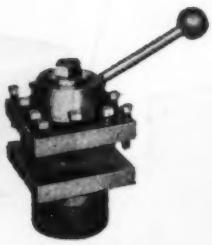

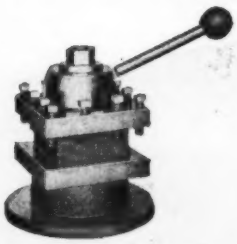

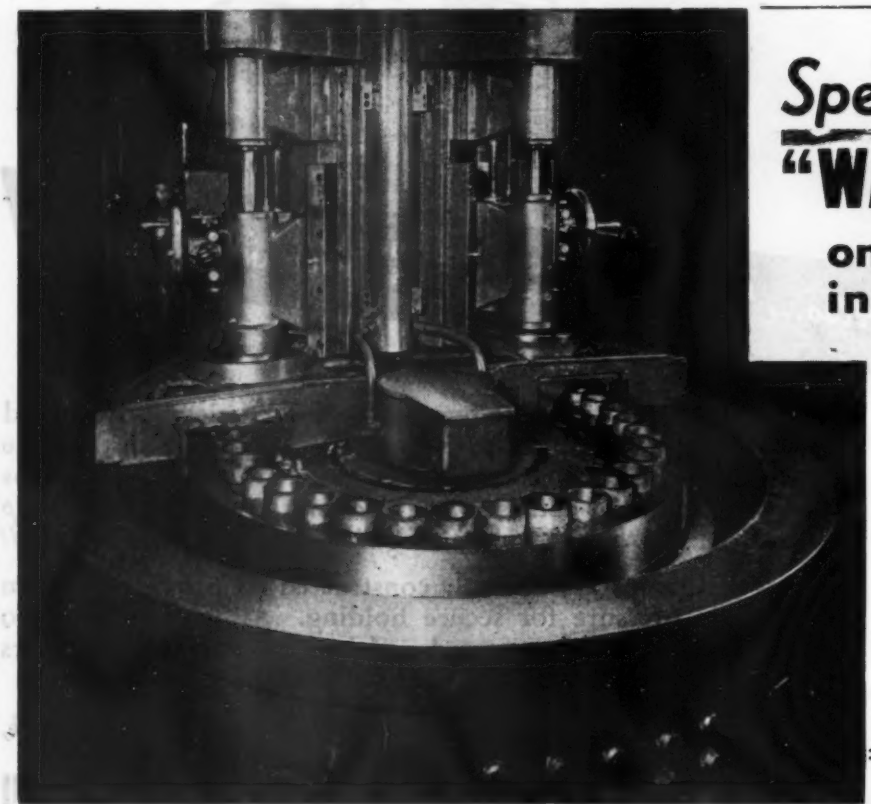

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To produce chips like these, drills must be precision-made . . . be accurately ground . . . have uniformly-dimensioned, uniformly-angled cutting edges, always with proper lip clearance. Obviously, that's how Morse Drills *are* made. That's why there's less spoilage, less down-time . . . that's why costs usually drop . . . when plants start using Morse Drills. Start using Morse Tools yourself!

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FOR ALL ANGLE MACHINING

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TILTS IN EITHER DIRECTION

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ADAPTABLE FOR USE ON MILLING MACHINES, PLANERS, BORING MILLS, ETC.

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ENABLES YOU TO DO WORK NOW REQUIRING FAR MORE EXPENSIVE MACHINES

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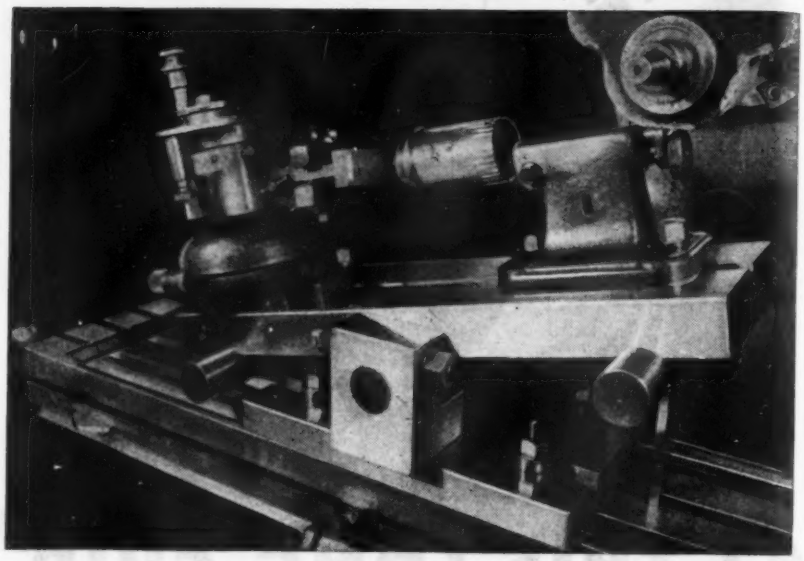
TWENTY INCH SINE BAR CONSTRUCTION INSURES ACCURATE SETTING OF ANY ANGLE UP TO FORTY-FIVE DEGREES IN EITHER DIRECTION



View showing index head and center mounted on this fixture for milling slots in cylinder at a multiplicity of angles. This set-up eliminates the necessity of making special riser blocks to mount index centers

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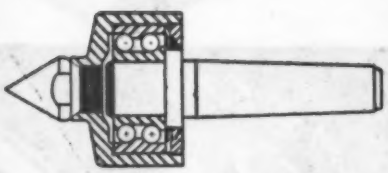

SHORT OVERHANG

and accurate — at all speeds — *because* of short overhang and preloaded ball bearing. Point ground after assembly assures true center point.

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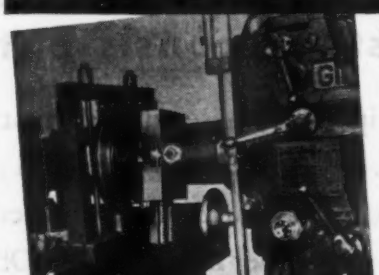
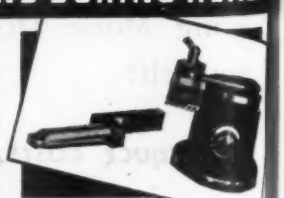
For use on HORIZONTAL BARS



WILL TAKE ANY CUT THE BAR ITSELF WILL STAND.... A *REAL TIME AND COST SAVER!*

Regent SELECTIVE AUTOMATIC FEED FACING AND BORING HEAD



A moderately priced horizontal boring bar attachment that utilizes the forward and backward feed mechanism of the boring bar itself, providing a wide range of cuts for roughing and finishing. Up to 75% time saving on certain work is possible, as only one tool bit is used. Quickly detachable and ruggedly built so that it will take almost any cut the bar itself will stand—made in 2 sizes—model 10 with a range of from 0" to 12" diameter, and model 20, with a range of 0" to 24" diameter. Illustrated is model 20, and the same model on a step-facing job.

Complete information and prices upon request.

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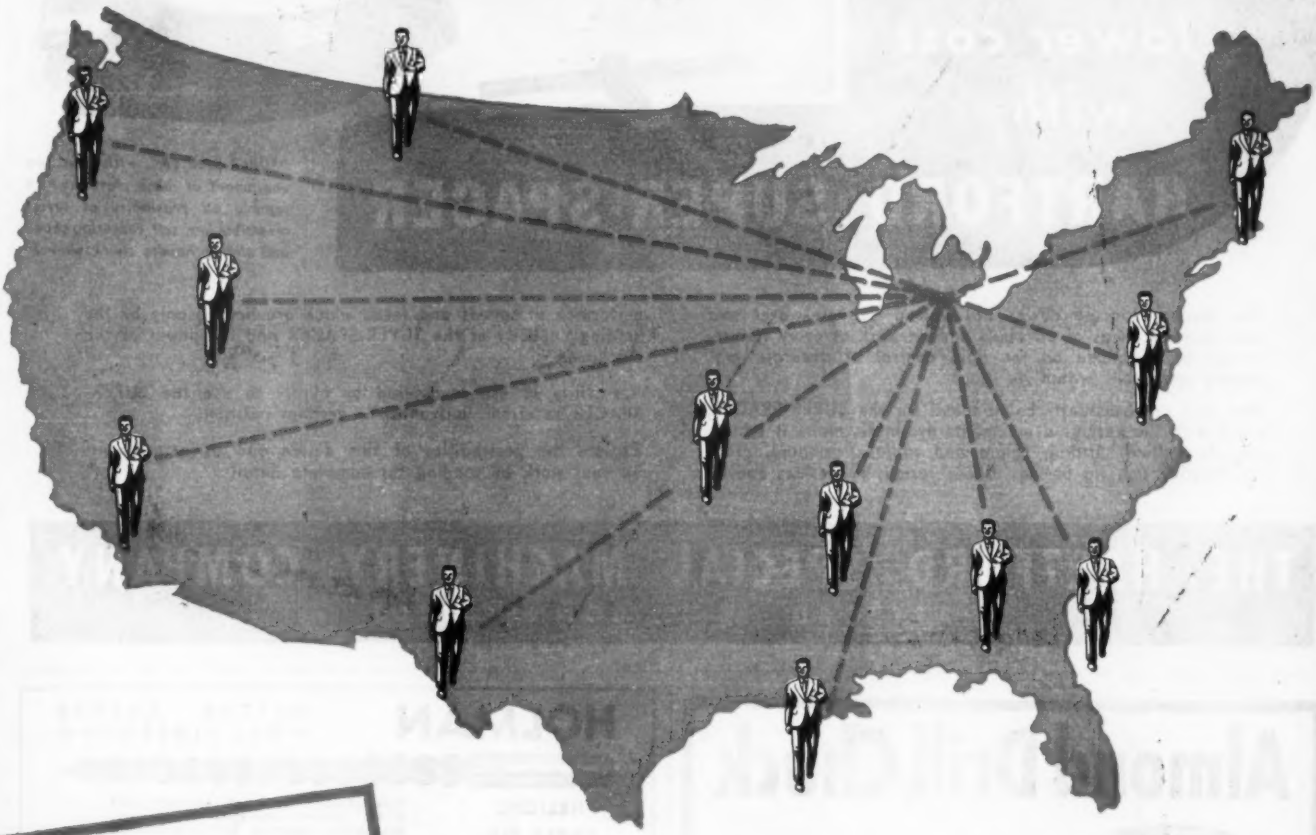

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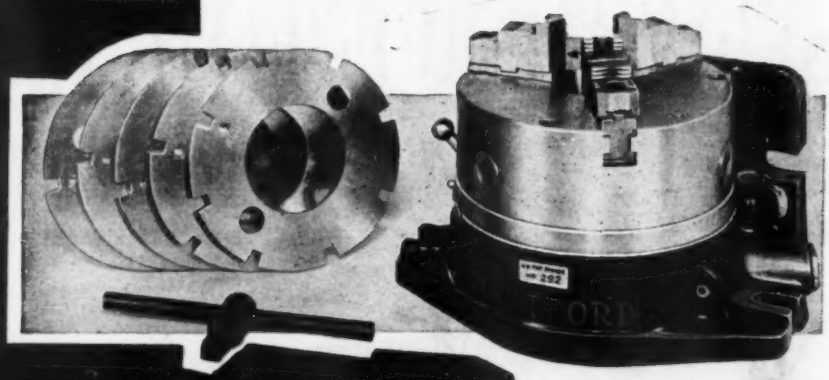

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Hjalmar Ellstrom (in center) taken about 1900, with group of workmen in front of cottage where the first gage block sets were made.

by making gage blocks for industry throughout the world. In fact, they were the only ones to make a major improvement on Hjalmar Ellstrom's original gage block by successfully chromium plating the gaging surfaces of their blocks to increase their wearing qualities.

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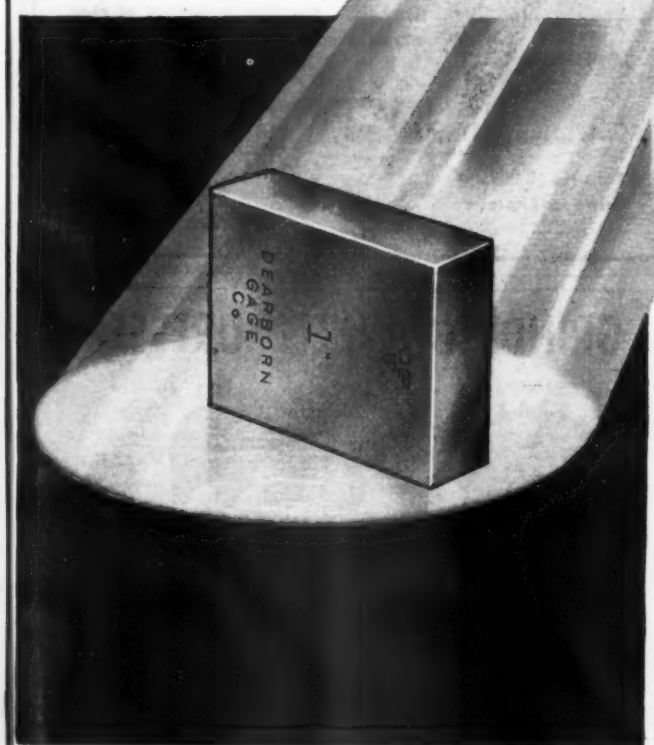

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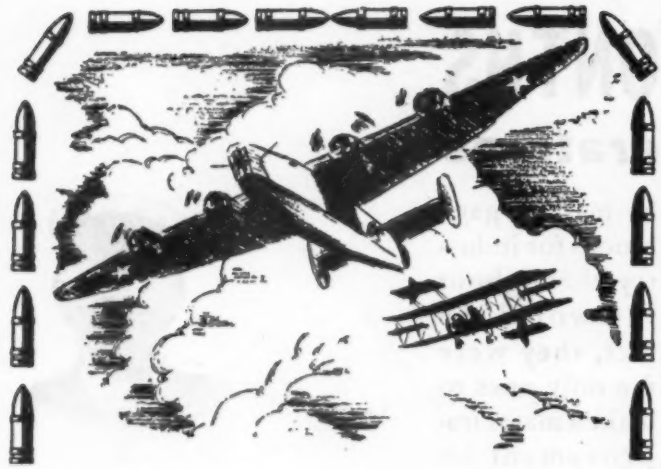

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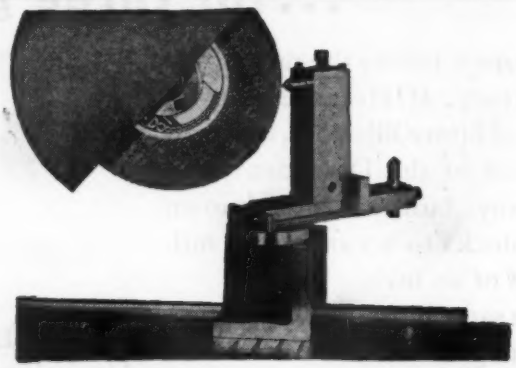

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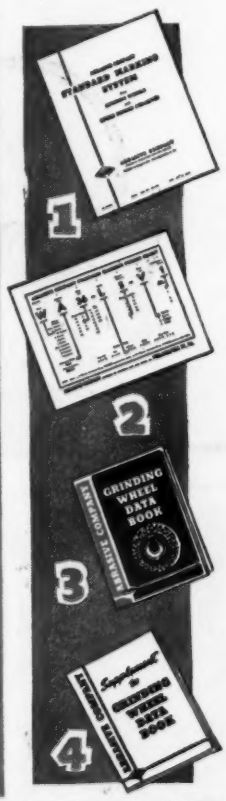

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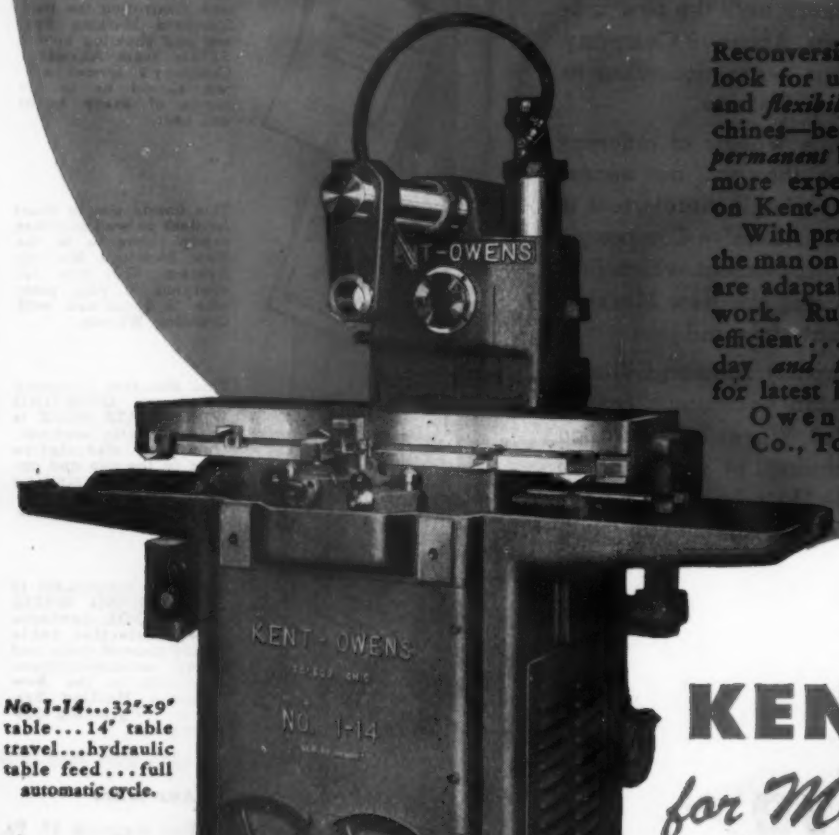

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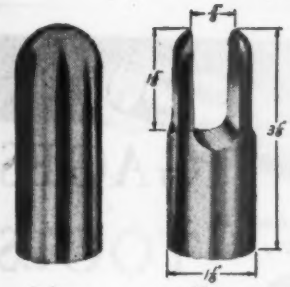
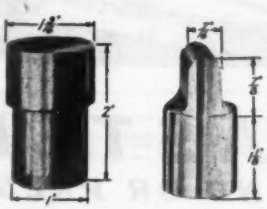


Before *After*

Aluminum Parts

These aluminum parts were milled upon the Aerco Multi-Grip Chuck at the rate of 355 per hour (floor to floor) as compared with single milling operations of only 71 per hour.



Before *After*

Chrome Steel Parts

These parts, high heat treated of Chrome-moly, were produced at the rate of 62 per hour (floor to floor) on the Aerco Multi-Grip Chuck. Individual milling time was 15 per hour.

These parts milled with the use of the Aerco Multi-Grip Chuck show its versatility.

with the AERCO HYDRAULIC MULTI-GRIP CHUCK

Two rows of collets hold ten parts and both rows are milled simultaneously and with but a single loading increasing production as much as 500%.

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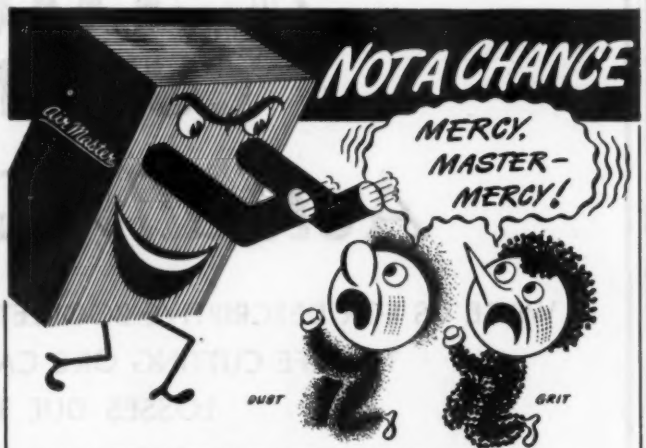

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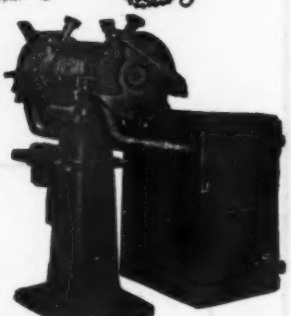

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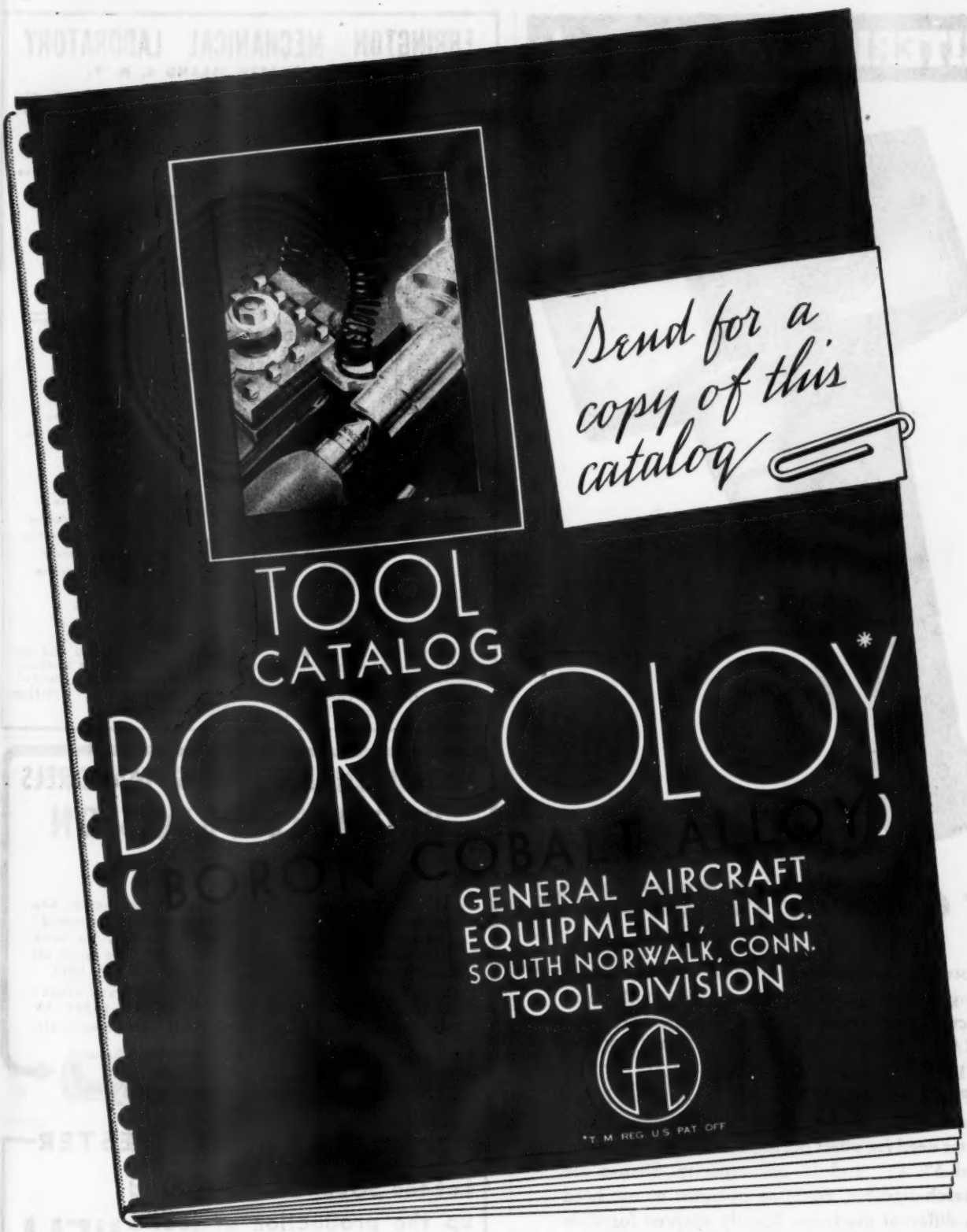

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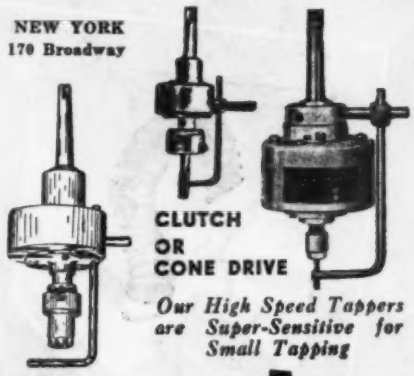

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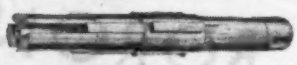

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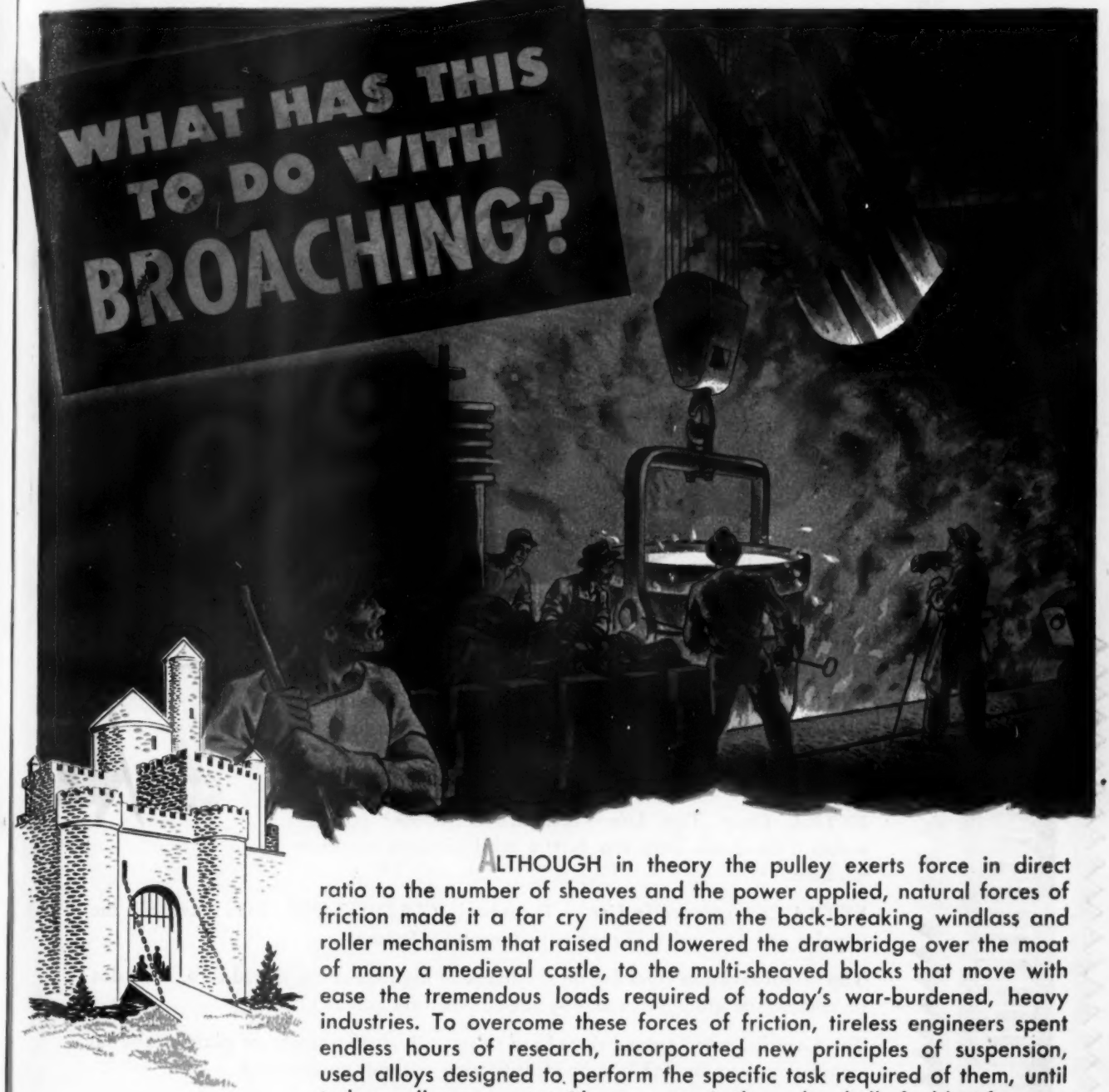
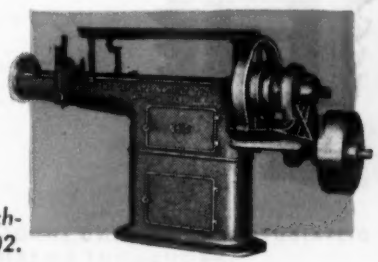


ALTHOUGH in theory the pulley exerts force in direct ratio to the number of sheaves and the power applied, natural forces of friction made it a far cry indeed from the back-breaking windlass and roller mechanism that raised and lowered the drawbridge over the moat of many a medieval castle, to the multi-sheaved blocks that move with ease the tremendous loads required of today's war-burdened, heavy industries. To overcome these forces of friction, tireless engineers spent endless hours of research, incorporated new principles of suspension, used alloys designed to perform the specific task required of them, until today, pulleys operate with ease, even in the molten hell of a blast furnace.

TO take advantage of broaching's high-speed, uniformly close-tolerance operation . . . many parts previously thought impossible to produce by broaching methods, have been either re-designed under the impulse of war necessity, or special machines and fixtures designed to produce them. Diligently searching, constantly improving, ever eager to combine modern, labor-saving manufacturing methods with time-proven principles, Lapointe engineers welcome the opportunity to be of service to you in your post-war planning . . . to prove to you by actual production figures that broaching can produce for you . . . quicker, cheaper . . . better!



The first screw-type horizontal broaching machine built by Lapointe in 1902.

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HUDSON, MASSACHUSETTS, U. S. A.

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Greaseless rust-proofing, clean and dry to handle, always.

EXTRA Attention To Your Needs — *personal* attention to every order at the factory and by your Threadwell distributor.

Why not try something new and better in Taps? It costs no more. Specify *Threadwell COLD-TEMPER* next time you order Taps.

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SINCE 1902
"TAPS OF DISTINCTION"

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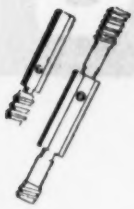

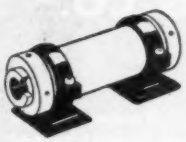

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- **RE-SET-ABLE** adds to life of your diamond . . . More work per carat. Exclusive patented setting is tender to the diamond . . . Holds firmly . . . Protects from damage . . . Guards against breakage.

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Eddie used to work for your *Industrial Supply Distributor, and his former job is waiting for him. He's eager to get back into "civvies" and to start calling on you again, as he did in the good old days. You'll find him just as willing and helpful as ever.

Yes—it will be good to have all the "Eddie's" on the job once more, showing you new products, helping you locate the hard-to-get items, pointing out new ways to cut costs and speed production. In the meantime your *Industrial Supply Distributor is worthy of all the cooperation you can give him. Short-handed and harassed, has he not been doing a pretty good job of taking care of your requirements during the present emergency?

Today—and tomorrow—you'll find it pays to

Telephone your I S D* FIRST!

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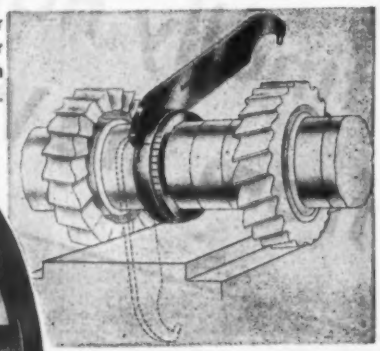
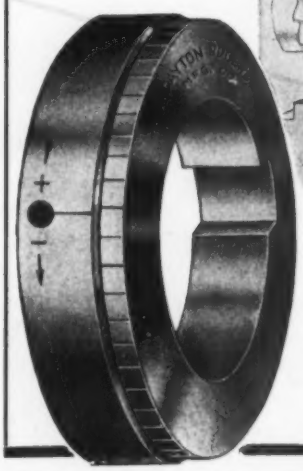
SAVE TIME ON YOUR GANG MILLING SET-UPS

You are assured FAST—ACCURATE spacing on all side milling cutters and gang milling setups with

DAYTON ROGERS ADJUSTABLE SPACING COLLARS

Just loosen cutter arbor nut and make plus or minus adjustment with handy wrench as shown.





"DAYTON ROGERS" ADJUSTABLE SPACING COLLARS are graduated in thousandths, with plus or minus markings as illustrated. A .0005 adjustment can easily be made by visual calibration. These collars are made in 12 standard sizes from ⅜" to 2".

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DAYTON ROGERS MFG. CO.

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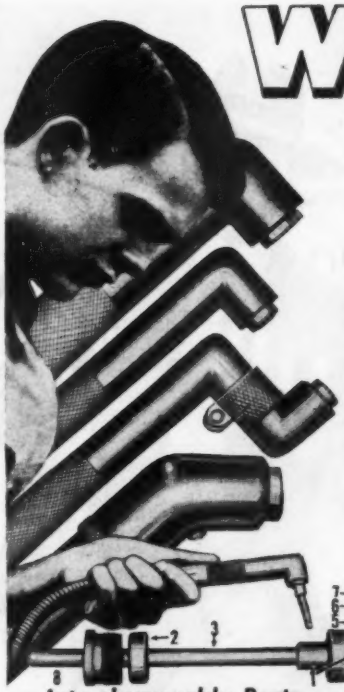
WYCO



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Speed Production

With WYCO Angle Heads you can Drill, Ream or Countersink in "Impossible Places" with Ease and Speed. Two sizes—½" and ¾" heads—Universal, 90° and 45° angles. Drill adapters in three sizes or with Jacobs chuck. All parts standardized and interchangeable. WYCO construction assures perfect alignment.

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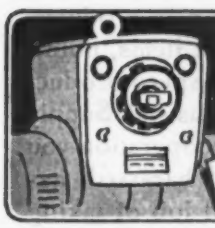

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with the exclusive REMOTE CONTROL

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STOPS LOSSES

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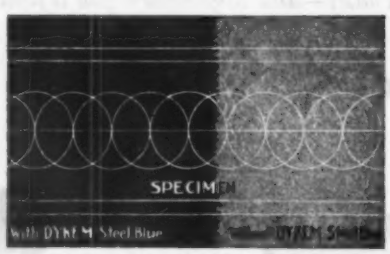

simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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End the danger quickly with *SPEEDI-DRI*

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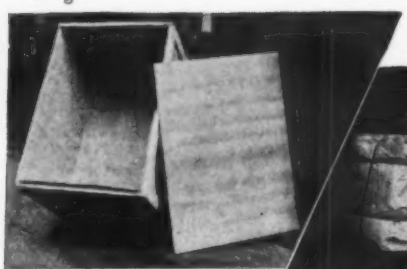
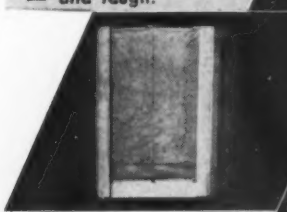
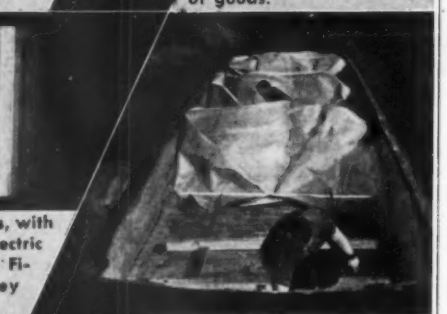


CASES lined with Fibreen are moisture and dirt proof. Fibreen is pliable — and tough.

BALES of all sizes and shapes, made with Fibreen, protect all types of goods.



CRATES built on skids, with engines, pumps or electric motors wrapped in Fibreen, save money for shipper.



OPEN-CAR shipments of heavy machinery need Fibreen to protect goods from weather and dirt.

ROLLS wrapped with Fibreen shut out weather and dirt.

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In postwar competition, *make sure* that *your* products have the best protection to destination. *Make sure* that losses due to inadequate "wrappings" are eliminated. Use Fibreen. As Fibreen is released from war duty, orders can be filled to meet your needs. One thickness of Fibreen often makes a better wrapping than several layers of other materials.

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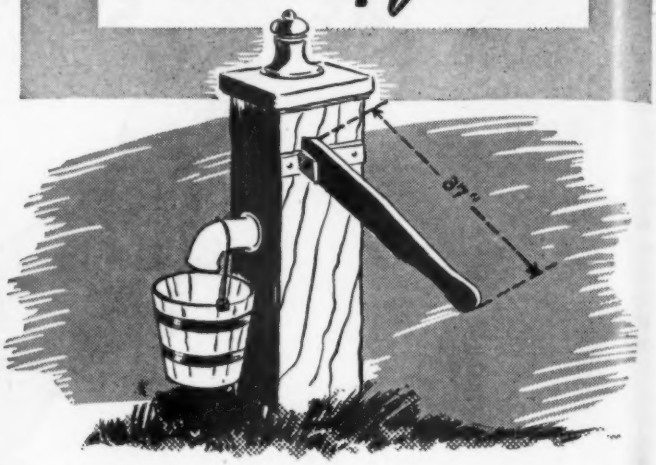
Manufacturers of SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

how to buy... *a cutting fluid*



●"It's hard to tell the depth of a well by the length of the handle on the pump"... and it's even harder to tell the real worth of a cutting fluid by appearances alone.

For instance:

Lower viscosity does not necessarily mean more effectiveness at the work area.

Dark oils are often cleaner than light-colored, clear-looking oils.

More total sulphur does not always mean better cutting quality.

Straight oils are often better refrigerants at the point of contact than soluble products.

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The wise buyer measures cutting fluids by how they perform on the machine. To find the best performing oil for his needs, he looks to experience.

D. A. Stuart Oil Co., specialists in industrial oils since 1865, share their experience with thousands of such wise buyers. They stand ready to do the same for you.

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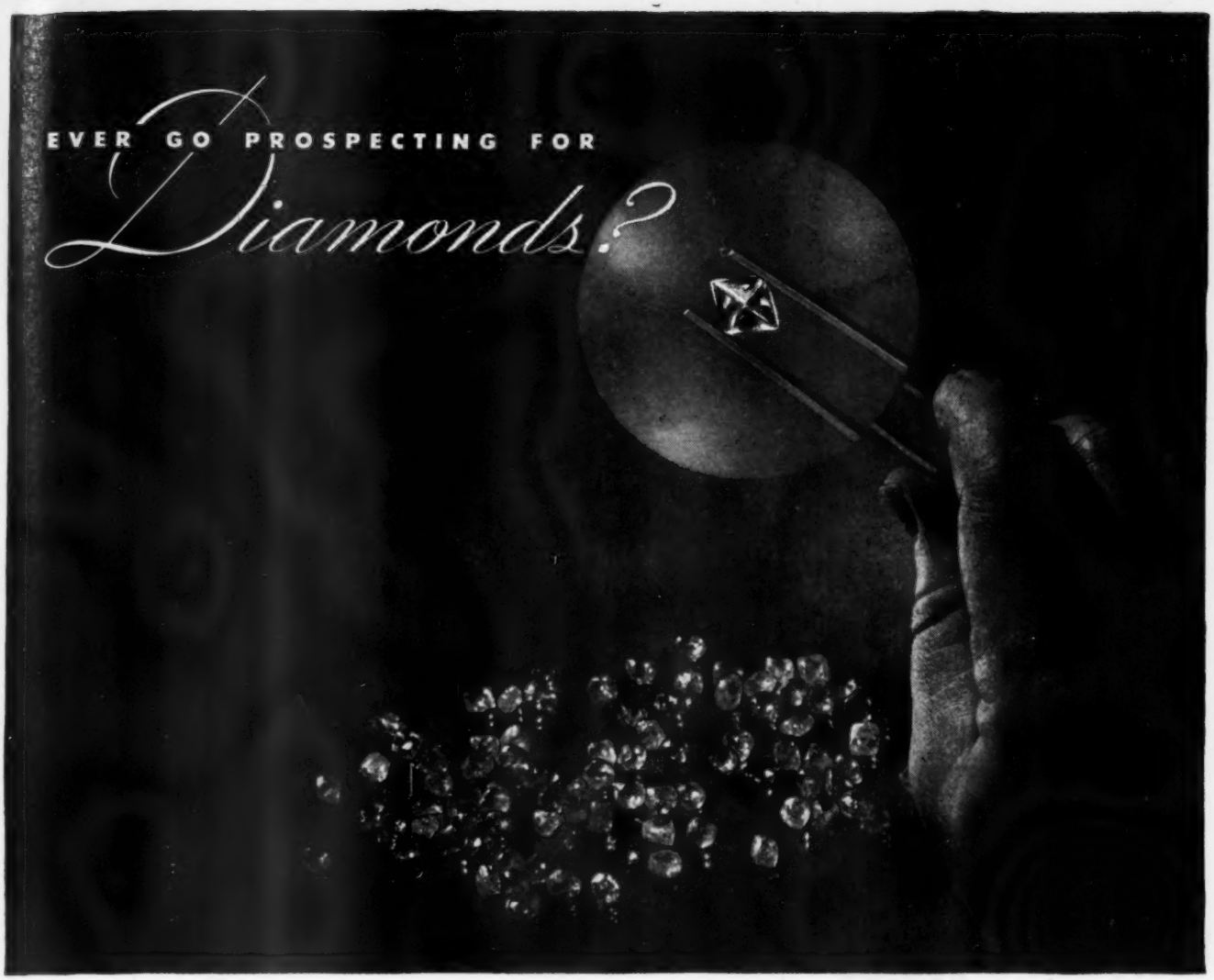

Do you like to spread out a package of diamonds and sort them over, looking at size and shape and structure and color, finding the stones with the twisted, knotty grain that stands up so well on the tough jobs, mentally marking the big rugged fellows for the big, coarse-grained wheels, smaller stones for the finer wheels, special shapes for this tool or that?

That's how experienced diamond buyers—production men, purchasing agents and heads of grinding departments—have been buying Wheel Trueing diamonds for more than a third of a century although, in many instances, we have come to know their requirements so well that they leave the matter of selection entirely in our hands.

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Your inquiry will receive prompt attention.

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Tool life greatly increased by reconditioning cutting oil *with*
BARRETT OIL EXTRACTION SYSTEMS

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The Barrett Centrifugal Oil Extractor removes 99½% of the recoverable oil from chips and turnings in two minutes or less. We are also prepared to furnish complete Barrett Oil Recovery and reconditioning systems including extraction, sterilization and sedimentation equipment. The units involved are available in various sizes individually or as a group, arranged for full manual control, semi-automatic control, or full automatic control requiring only loading, unloading, starting and stopping of the extractor by the operator. Complete plans including storage tanks for reclaimed oil or for use in conjunction with existing equipment are also available.

With the Barrett system, abrasive-free oil assuring longer tool life can always be depended on. With Barrett Sterilization and Sedimentation equipment, cutting oil is also safe and free from contamination.

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Barrett Centrifugal Oil Extractor—the heart of Barrett Cutting Oil Recovery and Reconditioning Systems.

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Because . . .
Mac-it **Process makes**
them STRONGER
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more ACCURATE

Mac-it Products Include: Socket Head Cap Screws, Hollow Set Screws, Hexagon Head Cap Screws, Square Head Set Screws, Stripper Bolts, Hexagon Socket Pipe Plugs.

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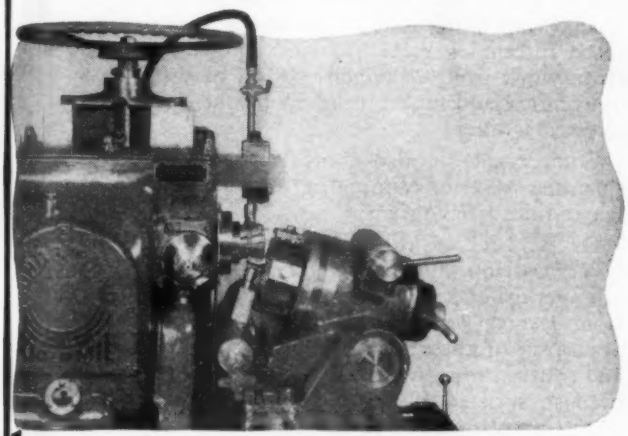
How Sundstrand Engineered Production Will . . .

Improve Your Milling Methods

One of these 3 methods will be most economical for your production milling job

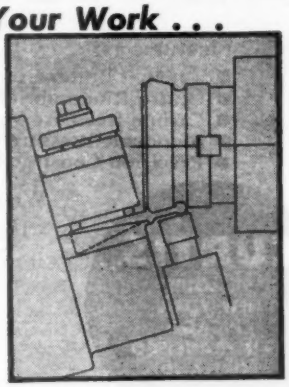
NO PRODUCTION problem is solved efficiently unless it is done with a minimum of equipment. When standard machines cannot be used without design changes, or, if obtaining production requires a battery of standard machines and operators, thereby raising unit costs, these Sundstrand production design methods will produce low unit cost milling.

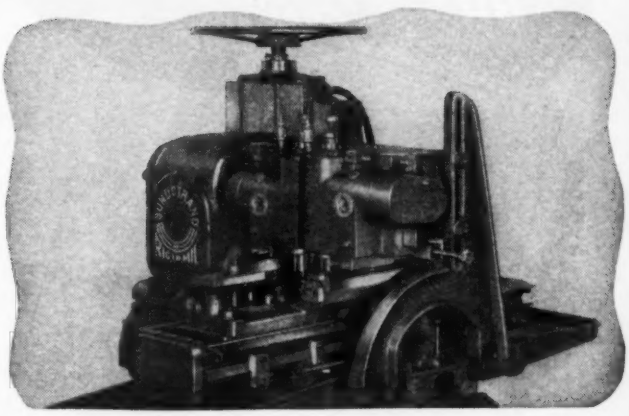
The following three solutions to production milling problems illustrate the Sundstrand method and facilities for providing the most economical solution to production milling jobs. Our engineers will be glad to work with you in a similar capacity. Call on them without obligation.



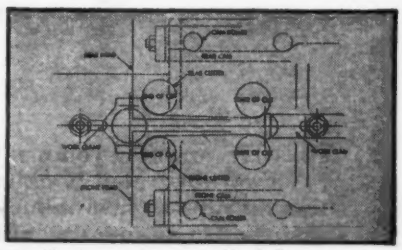
1 Using Standard Rigidmils with Fixtures and Tooling to Suit Your Work . . .

STANDARD No. 1 Hydraulic Feed Rigidmil provided with special work holding fixture arranged to hold one turbine blade part. Form milling the shank end is first completed on one side. The part is then indexed 180° and operation repeated on opposite side.

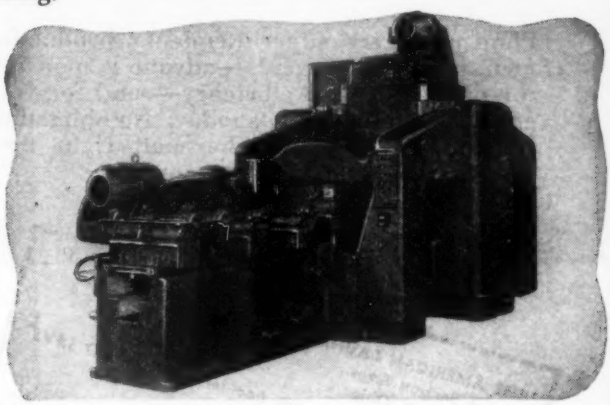




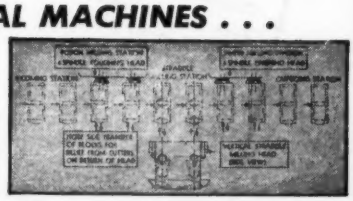
2 Rigidmils with Special Heads and Tooling . . .



MILLING taper and radius of both sides of an airplane connecting rod on a No. 1 Hydraulic Rigidmil equipped with a special work holding fixture and special twin spindle vertical heads. Each spindle is cam controlled for contour milling.



3 ENTIRELY SPECIAL MACHINES . . .



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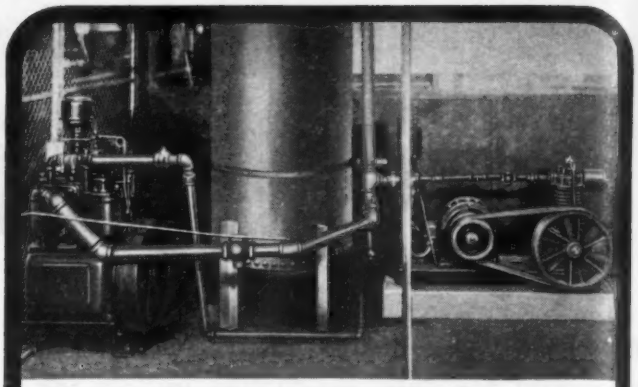

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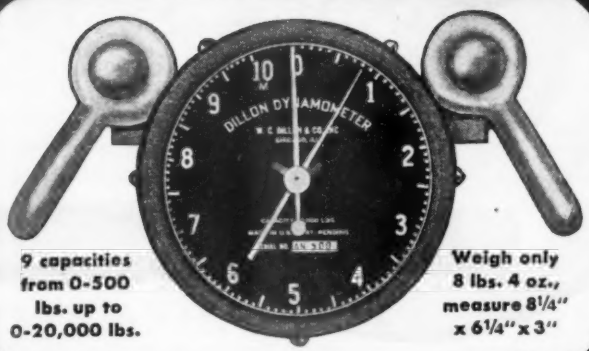

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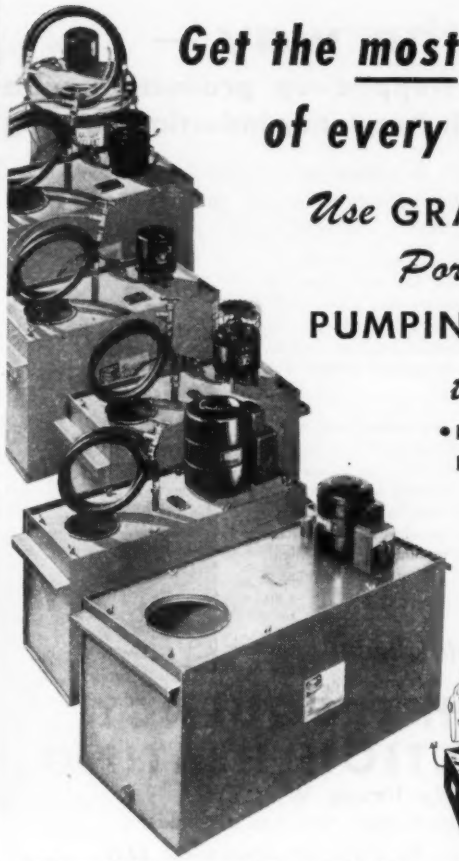

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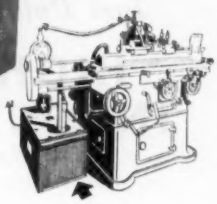

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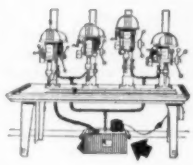

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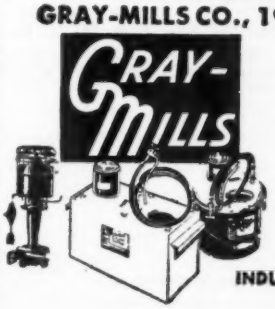

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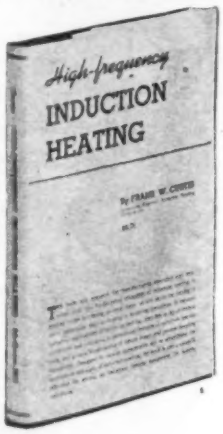

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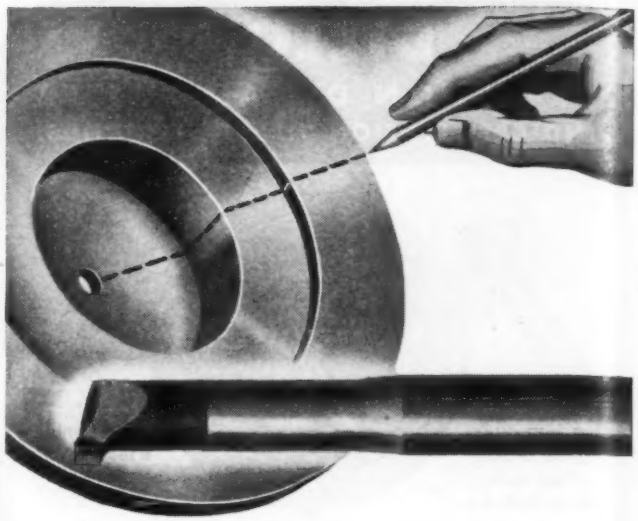

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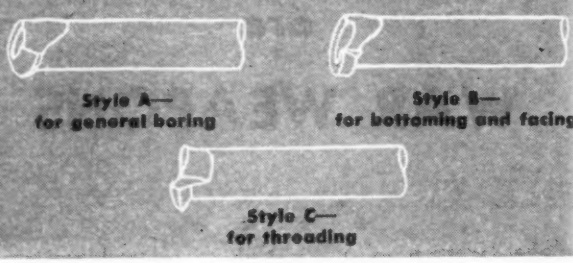

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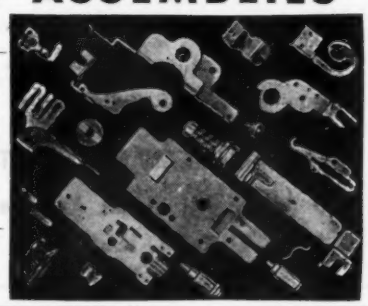

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WANTED: An experienced tool and die maker as a foreman of our tool room. We want a man who wants a better position and is not getting his chance. Must have experience with sheet metal dies. This is a position in a plant with an already established postwar product. Houses available for a man with a family. Pittsburgh Dubois Company, Dubois, Pennsylvania.

EXPERIENCED MACHINE tool designers and detail draftsmen wanted. Apply by letter giving full information of training, experience, and salary required. WMC rules apply. Write P-148, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

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WANTED—An experienced and able designer of heavy machinery. Applicant should have sound grounding in mathematics, preferably a graduate mechanical engineer, and should have had several years' experience in machine design. Position is with growing business in an essential industry with opportunity for advancement. Give full background of education and experience, with previous and present employers, which will be held confidential. P-150, American Machinist, 330 W. 42nd St., New York 18, N. Y.

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(Additional Employment Advertising an pages 282 & 283)

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(Continued from preceeding page)

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WELDING SHOP comprises: 15 different type and size WELDERS; also 20,000 LBS. of WELDING ROD. 20 TONS STEEL PLATE, Tees, Flats, Tubing, 15—Gas Fired Carrier Ceiling Heaters, Fluorescent Lights, Vises, Work Benches, Ceiling and Wall Ventilators.

INSPECTION: JANUARY 8th TO SALE DATE—ALL MOTORS ARE 3 PHASE, 60 CYCLE, 220 VOLT

DETAILED CIRCULAR ON REQUEST

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Industrial Plants Corporation

Auctioneers, Appraisers, Liquidators

90 WEST BROADWAY, N. Y. 7

316 SO. LASALLE ST., CHICAGO 4, ILL. — **TOLEDO, O.—PITTS., PA.**

AN OPPORTUNITY FOR A REAL PRODUCTION ENGINEER

A large, well-financed manufacturing organization in the middle west is seeking the services of a practical, experienced manufacturing executive. The man we want must know tool and product engineering, machine shop practice, factory layout, machine installation and modern production methods. We are looking for a man of initiative, judgment, resourcefulness and tact in handling problems associated with the manufacture of diversified lines of products, and who has the ability to select, train and supervise all types of manufacturing employees. This is an old established business with good working conditions, under young and progressive management. To the right man we can offer a postwar opportunity limited only by the capabilities of the man himself. If you think you can qualify, write in detail giving your complete history, experience, qualifications and salary expected. If we are interested, a personal interview will be arranged at our expense.

P-145, AMERICAN MACHINIST
520 NORTH MICHIGAN AVE. CHICAGO 11, ILL.

WANTED

MECHANICAL ENGINEER

In light metal stamping and screw machine work.

ALSO

EXPERIENCED DRAFTSMAN

Good opportunity in old established company. Give full particulars as to experience and salary desired.

P-139, American Machinist
520 North Michigan Avenue
CHICAGO 11, ILLINOIS

WANTED

PRODUCTS OR INVENTIONS FOR POST-WAR MANUFACTURE

We will purchase outright or manufacture on a royalty basis, household, automotive, tools, or any specialty of recognized merit. We are a well organized and equipped metal working company. Write giving details of your product or item. Address.

BO-953, AMERICAN MACHINIST
520 North Michigan Ave.
Chicago 11, Ill.

PUNCH PRESS WANTED

One 70 to 90 ton back-geared mechanical punch press with 6 to 8 inch stroke.

Reply to W-144, AMERICAN MACHINIST
330 West 42nd St. New York 18, N. Y.

WANTED

1—12' Cincinnati Vertical Boring Mill with 2 heads, power rapid traverse, A.C. motors, late type machine desired.

D. E. DONY MACHINERY CO.
47 Laurelton Road, Rochester 9, N.Y.

We are interested in buying one 8½" or 11" Double Threading Goss & DeLeeuw Four-Spindle Tool Rotating Automatic Chucking Machine.

What have you to offer? Kindly advise with full description and age of machine.

W-111, AMERICAN MACHINIST
330 West 42nd St. New York 18, N. Y.

FOR SALE

Davenport 5 Spindle Automatic Screw Machine—Serial 110-317. Equipped with 3 H.P.—220 V.—60 Cycle 1200 R.P.M. Motor. ¼" Round collets and feed fingers, capacity ½" Round. Full Set Blue Prints and Instruction Sheets.

BOWERS BATTERY & SPARK PLUG CO.
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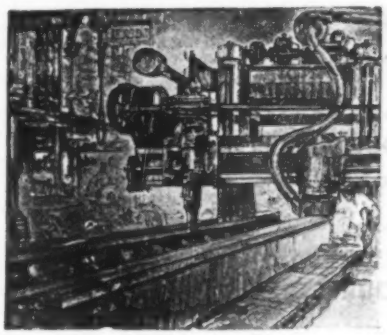

By Simmons

Every machine listed in this column is in our warehouse at press time.

- 42" BULLARD NEW ERA, 11000 serial
- 42" N.B.P. Car Wheel Borer
- 66" N.B.P. Vertical Tire Mill
- 27" BRIDGEFORD Axle Lathe
- 29" PUTNAM Axle Lathe
- 42" PUTNAM Car Wheel Lathe
- 2½" Bar CLEVELAND Horizontal, Table Type Boring Mill
- 2¼" Bar LUCAS Horizontal, Table Type Boring Mill, M.D.
- 5" Bar DETRICK-HARVEY Floor Type Boring Mill
- 4' HAMMOND Sensitive Radial Drill
- 7' AMERICAN Universal Radial Drill
- 7' CARLTON Motor-on-arm Radial Drill
- BLANCHARD No. 16 Surface Grinder
- 33" x 9" G&E Spur Gear Cutter
- 36"x18' N.B.P. Lathe, G.H., M.D.
- No. 2 CLEVELAND Plain Miller
- No. 3-B MILWAUKEE Plain Miller
- #4 BROWN & SHARPE Universal Miller
- No. 5-B B&S Plain Miller
- No. 6 BECKER Vertical Miller
- No. 10 N.B.P. Heavy Vertical Miller
- 24"x24"x12' INGERSOLL Planer Miller, M.D., 3 heads
- 24"x36"x12' INGERSOLL Side Head Planer Miller, M.D.
- 30"x36"x12' INGERSOLL Planer Miller, M.D., 3 heads
- 30"x30"x10' NEWTON Slab Miller
- 24"x24"x6' WHITCOMB Planer, one rail head, 230 Volt, D.C.
- 30"x30"x12' N.B.P. Planer, two heads, 230 Volt, D.C.
- 36"x36"x12' POWELL Planer, 4-heads A.C. Motor Drive
- 48"x48"x20' PATCH Planer, 4-heads, 230 Volt, D.C.
- 48"x48"x24' N.B.P. Planer, 3-heads, A.C. or D.C. Motor Drive
- 72"x72"x18' N.B.P. Heavy Planer 4-heads, 230 Volt, D.C.
- RT-40 SCHULTZE-NAUMANN Beam Shear
- 5" Capacity U.E.F. Alligator Shear
- 72"—105-Ton L&A Multiple Punch
- 6"x⅝" SOUTHWARK Double Angle Shear
- 12" SELLERS Crank Slotter
- 20" SELLERS Crank Slotter
- 2" LANDIS Pipe Threader
- 6" BIGNALL-KEELER Pipe Threader

SIMMONS ENGINEERED Machine Tool REBUILDING

SIMMONS MACHINE TOOL CORP.
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EASTERN OFFERS FROM STOCK

Immediate Shipment No Priority

Eastern Rebuilt Machine Tools

ARBOR PRESSES
15 ton Lucas High Pattern
30 ton Lucas
Barnes Screw Press, hand operated
King Screw Press, s.p.d.

AUTOMATICS
4 spindle ⅞" Cleveland Model M, m.d.
4 spindle 2¼" Cleveland Model K, m.d.
2¼" Cleveland Model A, m.d.
2¼" Gridley, m.d.
2½" Cleveland Model A, m.d.
3¼" Gridley, m.d.
4¼" Cleveland Model A, m.d.
6" Cleveland Model A, m.d.
No. 6A Potter & Johnston, m.d.
No. 6C Potter & Johnston, m.d.
No. 6D Potter & Johnston, arr. for brake drum work
No. 22 New Britain, belt, tapping spindle
No. 23 New Britain, belt, tapping spindle
No. 33 New Britain, m.d., tapping spindle

BOLT THREADING MACHINES
¾" Economy Style R Auto. Threading, with Lanco Head
No. 11-S Rickert-Shafer Auto., cap. 1" rods 36" long
1" Landis, cone
1¼" Landis 3 spindle, cone

HORIZONTAL BORING MILLS
No. 0 Fosdick, 3" bar, m.d.
No. 21 Lucas, 2½" bar, m.d.
No. 33 Lucas, 4½" bar, m.d.
3½" bar Betts, m.d.
3½" bar Rochester Floor Type, m.d.
4" bar Niles, m.d.
4" bar Detrick & Harvey Floor Type, m.d.
4½" bar Niles, m.d.
5½" bar Niles-Bement-Pond, m.d.
2¾" bar Sargent, floor type, belt
5" bar Niles Floor Type, m.d.

VERTICAL BORING MILLS
36" Bullard New Era, m.d.
42" Bullard Spiral Drive, m.d., chasing attach., coolant system
42" Bullard New Era, m.d., coolant system
42" Colburn H.D., 2 swivel heads
42" Niles-Bement-Pond Car Wheel Borer, facing attach.
48" Cincinnati Rapid Production, 1 turret, 1 rail head, m.d.
48" Putnam Car Wheel Borer, facing attach., belt
60" Niles-Bement-Pond, 1 swivel, 1 turret head, m.d.
10' extended to 16' Betts, m.d., 2 swivel heads
12' Niles, m.d., 2 swivel heads, p.r.t.

BROACHING MACHINES
Colonial Model VAS-5-42 Hydraulic Broach, 5 tons normal cap., latest
75 H.P. LaPointe Hydraulic Broach, m.d., latest type, normal capacity 37½ tons, stroke 150", cutting speed 17' per minute
Cincinnati Mill Broach, new, m.d., 10" spindle
No. 2 LaPointe, belt
No. 2 LaPointe of Hudson, belt
No. 3 LaPointe Double, belt
No. 4 LaPointe of Hudson, s.p.d.

BALL BEARING DRILLS
Automatic Sens., m.d.
14" Canedy-Otto, m.d.
Allen Bench Type, m.d.
No. ½ Avey, m.d.
No. 1 Avey Bench Type, m.d.
No. 5M-16" Fosdick, m.d.
Mason Bench Type, belt
Providence Eng. Model K, m.d.
Providence Eng. Model E, s.p.d.
Sipp Quick Change, m.d.
Taylor & Fenn H.S., belt
Henry & Wright Class K, belt
Allen, belt
2 spindle Sigourney, belt
3 spindle Barr, belt
4 spindle No. 3 Avey, m.d., 12" overhang, 2 spindles p.f.
4 spindle Gardam, belt
4 spindle Kokomo, belt
6 spindle No. 3 Avey, m.d.

UPRIGHT DRILLS
22" Barnes All Geared Self-Oiling
24" Hoefer, m.d.
26" W. F. & John Barnes, belt
30" Prentice, m.d.
30" Rich H.D., m.d.

More than 1,000 machines in stock for immediate shipment. Send us your inquiries.

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CLOSEOUTS

BORING MILL
VERTICAL
34" Rogers
66", 120" Niles
42" Bullard, M.D.
54" Colburn, M.D.

HORIZONTAL
2½" Universal, Binsee
4" Binsee
3" Cleveland

TURRET LATHES
No. 2A, 3A, W. & S. 4½" hole
18" Libby, 3½" hole
24" Gisholt, 6½" hole
Foster Nos. 4, 5, 6
Foster No. 1B, M.D.
W. & S. No. 4 Univ., Grd. Hd., M.D.
J. & L. 2¼x24, 3¼x36"
Acme 3¼x36" grd head

GRINDERS
P. & W. 14", 18" B.B. Vert., M.D.
Blanchard 26", 30", M.D.
Modern 12x48", M.D.
Norton Hydr. 12x18", M.D.
Heald No. 50, 55, 60, M.D.
Norton 50"x28', M.D.
Gardner 72" Disc, M.D.
Landis 6x20" Hydraulic, M.D.
Bryant No. 12, M.D.
B & S #3 Univ.
B & S #11 S.P.D.

LATHES
14"x6' Hendey, Taper
48"x12' Harrington Gap Sid. Bed
McCabe 26-42"x14'
32"x25' New Haven, raising blocks to 60"
20"x14' Rahn-Larmon, raised to 24", M.D.
16"x8' Lodge & Shipley Grd. Hd. Taper, M.D.
14"x6' Mulliner, taper
14"x6' Sebastian Grd. Hd.
9" LeBlond Automatics
Wickes 32"x26', M.D.
LeBlond 36"x21' M.D.
Putnam 36"x30', M.D.

AUTOMATICS
New Britain 1⅝", 6 spindle
Cleveland Model A, ½", ⅝", ¼", 2"
Cleveland ⅞" Model M 4-spindle
Cleveland Model B, 1", 2"
Gridley 4¼", sgle. spdle.
B. & S. Nos. 00, OG, 2
P. & J. No. 6A, M.D.

GEAR CUTTERS
No. 3, 12 Barber-Colman Gear Hobber
No. 6 Fellows Gear Shapers
B. & S. No. 3-26", 4-36"
Gleason 11" Bevel

MILLING MACHINES
No. 20 Van Norman
10" P. & W. Automatic
No. 2A Milwaukee, S.P.D.
No. 3S Cincinnati, S.P.D. Rpd. traverse, M.D.
Nos. OY, 1Y, 3, 4, 5, B. & S. Plain & Univ.
B. & S. No. 12, 13, 13B
Hall Planetary Model D
Providence Planer Type 32"x8'
Becker Nos. 3, AB, 5, 6
Nos. 3, 4, Cincinnati Vert.
P. & W. No. 12 Profiler, dbl. spindle
30" Pratt & Whitney Profiler
No. 4, B. & S. Universal

RADIALS
5' Dreses, Full Universal
8' Amer. Triple Purpose
3', 3½' Cine-Bickford
4' Mueller, M.D.
4', 5' Western, S.P.D.

MISCELLANEOUS
6 spindle Avey Drill, 15" overhang
800 ton Coining Press, McCabe ½" Flanger
Rochester 5B Hammer
Pels 6' Throat punch
P. & W. 6" Vert. shaper
Marvel Metal Band Saw, M.D.
Pipe Machines, 4", 6", 8", M.D.
N.B.P. 15" Slotter, M.D.
150 ton United Forging Press
Thompson-Gibbs Spot Welders 17 KVA
Anderson Tapper, No. 3 Quickwork Rotary Shear
6x80" P. & W. Thread Miller
⅜"x5' Plate Levelling Roll
4x4x⅝" W. & W. Angle Bending Roll
Gorton No. 15, 3S Engraving Machines.

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SHEARS

#672 Niagara, 72" x 10 ga. 24" Gap
Lennox Splitting Shear, 8' throat, 3/4" cap., arr. M.
Lennox Bevel Shear, 3/4" cap., arr. M.D
Dreis & Krump Brake, 10' x 10 ga., #204, motor driven.

PRESSES

#4 Bliss D.C. B.G. Forging 4" stroke.
#4 1/2 Bliss D.C. B.G. Forging 4" stroke (2).
#4 1/2 Bliss 3 column B.G. 3" stroke.
#5 Bliss D.C. B.G. Forging 3" stroke.
#74 1/2 Bliss S.S. geared, 2" stroke.

BORING MILLS

100" Niles-Bement-Pond Bor. & Turn. Mill. Vertical. 48". Gisholt.
Hill 4" Bar Horizontal Table Type.
Horiz. #36 Landis-Rochester, 3 1/2 Bar Floor Type—Floor Plate 72" x 120".
42" Bullard Vertical Boring Mill with side head; New Era Type.
54" Colburn Vertical Boring Mill.

DRILLING MACHINES

Cincinnati-Bickford 24", 4 spindle, #4 M.T. Table 20" x 67".
Superior 26" B.G., Sl. Hd., tapping, P.F.
Avey, 2 & 3 spindle Prentice, 4 spindle.
Henry & Wright, 6 spindle.
Leland Gifford 2 spindle.
Woodward & Rogers 6 spindle.

RADIAL DRILLS

3' Dreses, 9" Rd. Column.
3' Arm 9" Col. Cincinnati Bickford
4' Arm 11" Col. Cincinnati Bickford
5' Arm 11" Rd. Col. Cincinnati Bickford.
5' Arm 13" Rd. Col. Cinn. Bick. air clamp.
6' Arm 14" Col. Cincinnati Bickford

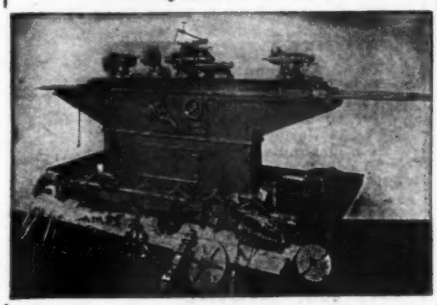
MULTIPLE DRILLS

Fox #15H 54 spindle hydraulic feed.
Natco #D-5, 10 spindles #1 M.T.

GRINDERS

16" Heald Rotary Surface Grinder.
#4 Brown & Sharpe Universal Grinder.
12" Heald Rotary Surface Grinder equip. with 9" Dia. Perm. Mag. chuck.
#2 Cincinnati Centerless Grinder, Filmatic.
#12 Greenfield Internal Hydromatic Grinder, sizematic type, complete with Tank and Pump.
Oliver Model 51 Drill Grinder; 1 1/2" cap.
Pratt & Whitney 14x36 model B vertical surface grinder.
#2 Brown & Sharpe Surface Grinder.

Brown & Sharpe No. 4 Univ. Cylindrical Grinder. M.D., with regular equipment.



Capacity:—Centers swing 12" dia.; over water guards 10 3/4". Distance between centers 60". Takes wheels to 12" dia.x1/2" to 1" thick. Longitudinal Table travel — 10 changes in rate; range 1 1/2" to 53" per minute. Work speed—6 changes for live or dead center grinding. B & S No. 9 taper hole.

MILLING MACHINES

#4 & #5 Cinn., High Power, Plain, S.P.D.
No. 3 Cincinnati, High Power, Vertical
No. 0 Bickett Vertical Bench Miller
No. 2 Cincinnati, High Power, Plain.
No. 2 Cincinnati, Motorized, Pyramid Col.
No. 2 Brown & Sharpe, Plain (10).
No. 1 1/2 Brown & Sharpe, Plain (2).
#1 Kempsmith Universal, Cone Drive.
No. 1 1/2 Valley City Universal, Cone Dr.
No. 1 Brown & Sharpe, Plain (6).
No. 12 P & W Lincoln Type Production (2).
Ames Precision Universal Bench Mill.
P & W 2" Duplex Spline Miller.
Hall Planetary Thread Miller 24".
No. 8 Lees Bradner Thread Miller.

PLANERS

120"x72"x35' Betts, 4 Heads, M.D.
72"x72"x18' Pond Heavy Pattern, 4 Heads.
48"x48"x12' Putnam Heavy, 2 Heads, M.D.
30"x30"x12' American M.D., 2 Heads.
30"x30"x10' Cinn. Heavy Pattern, 2 Hds.
20"x20"x36" N.-B.-P., Planer Shaper, M.D.

LATHES

South Bend 16" x 6' Motorized Gap Lathe.
Putnam 26 x 12 Heavy QCG, arr. for M.D.
American, 16 x 6 Q.C.G., Geared Head
Hendey, 16 x 10 Q.C.G., Turner M.D.
Potter & Johnston #6A Automatic Chuckers; 3 1/2" dia. hole in spindle (2).
LeBlond 14 x 6 Q.C.G.
LeBlond 16 x 6, Q.C.G.
Seneca Falls Tool Room 14 x 6, Q.C.G.
20 x 10 Lodge & Shipley, G.H., M.D., Taper Att. (2).

SHAPERS AND GEAR CUTTERS

26" Cincinnati Triple Geared, Belt Dr.
#61-2 Fellows 36" Gear Shapers (2).
12" Schuchart & Schutte Gear Hobber
#1 Adams Gear Hobbers, Belt driven (3).

BENDING ROLLS

Bertsch 3" x 3" x 3/8" angle bending roll.
Niagara pinch type 7' x 7" roll motor driven.

SLOTTERS

Betts 36" Geared Slotter, Motor driven, 54" dia. Rotary table.

MISCELLANEOUS

J. C. Miller Co. Lacq. Heater with acquistat.
Heat Treating Furnaces for the tool room, all sizes.
Sleeper & Hartley #1 Wire coiling machine for making BX cable.
50 K.W. Moesta Gun Welder Transformer portable, 25 cy. 440 volts.
Grinding Wheels for #2 centerless 4" face, 20" diameter.
Blake and Knowles 12x2x12 Simplex Type, Hydraulic Steam Pump, 2000 lbs. pressure with 80 to 125 lbs. steam, delivers 9 gallons per minute.
Niagara #98 Brake & Folder, 72" cap. 14 ga. arranged M.D.
#228C Greenlee Vertical Hollow Chisel Mortizer, Power feed, M.D.
No. 7B High Speed Riveting Hammer, cap 3/4" to 1 1/2". New this year.

HEADQUARTERS FOR POWER PRESSES

**The above list, selected from our current stock, is subject to prior sale or subsequent additions. Hence we urge your prompt inquiries on any of these machine tools or others in which you are interested.*

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MILES QUALITY TOOLS

AUTOMATICS

No. 0 Brown & Sharpe
1¾" Gridley 4-spindle
4½" Gridley 4-spindle chucking, Model H
No. 454 New Britain, 4-spindle chucking
7" Baird 6-spindle chucking
14"x19" Fay automatic lathe

COMPRESSORS

92' 7"x6" Ingersoll Rand
427' Chicago tandem steam driven
550' National 3-cylinder vertical with motor
1400' Sullivan 2-stage with motor

DRILLS

Sensitive, all makes and types
20" 21" & 24" Cincinnati upright
25" Weigel, BG, PF, tapping att.
36" Barnes, BG, PF, tapping att.
24" No. 10 HO Baker hydraulic, 1¾" cap.
3' Western radial, motor driven
3½' American radial.
4' Western radial, Timken bearing, MD.

GEAR CUTTERS

No. 16HS Gould & Eberhardt hobbers
No. 1 Lees Bradner hobbers
64"x20" G & E spur gear cutter
26"x6" G & E spur gear cutter
11" Gleason straight bevel, segments & gears
15" Gleason spiral bevel pinion and gear roughers
18" Gleason bevel testers and lappers
8" Red Ring spur gear lapper
Cimatool "Peerless" gear chamferers
Lipe 2-spindle gear chamferer

GRINDERS

Heald No. 72 automatic electric sizing internal
12"x36", 16"x36" and 16"x52" Landis
10"x36" Norton
8"x24" No. 1 Brown & Sharpe universal
6"x20" No. 10 Brown & Sharpe
20" Gardner semi-automatic disc grinder
6"x22" No. 78 Wilmarth & Morman surface
6"x24" No. 3 LaSalle surface grinder
12"x24" No. 1 Diamond surface grinder
Ingersoll face milling cutter grinder, type EN85
Cincinnati face milling cutter grinder
Gisholt tool grinder
16"x48" Landis crankpin grinder
No. 60 Heald & No. 8 Landis cylinder grinders

FORGING EQUIPMENT

No. 2B Nazel air hammer, motor driven
400# Chambersburg board drop hammer
No. 1 Evans Ajax taper forging roll
3" Acme upsetter (forging machine)

TURRET LATHES

36" Bullard vertical (spiral geared), new 1943
28" No. 3B Foster, 5¼" spindle hole
26" Libby 7½" hole.
26" Libby 4½" hole; taper attmt.
22" Libby 4½" hole, taper attmt.

MILLERS & BORING MILLS

2½" & 3" Universal boring mills
No. 3-B Milwaukee vertical miller
No. 3 Read Prentice vert. miller & die sinker
No. 3 Cincinnati plain some, vert. attmt.
No. 2 Kempsmith plain miller (new 1942)
Two No. 12 Brown & Sharpe bed type plain mfg. with electric control (new 1943)
48" Cincinnati automatic, bed type
No. 3 Sundstrand bed type mfg miller
48" Oesterlein tilted offset miller
Type C Hall planetary thread miller
Nos. 4 & 6 Lees Bradner univ. thread
42" Ingersoll continuous rotary
4" Rice Barton double spline

MISCELLANEOUS

No. 6 Waterbury Farrel openback press
6" Bignall-Keeler pipe threader
6"x6" Hilles-Jones angle shear & Turn table
No. 7 Greenard arbor press, practically new
Arcade jar molding machine
Cleveland sand cutter
4" Stevens die slotter. New 1941

SEND FOR COMPLETE LIST

MILES MACHINERY CO.
SAGINAW, MICHIGAN

. . . IN STOCK

AUTOMATICS

9/16" Davenport Model DA, five spindle
⅞" Cleveland Model M, four spindle
Model H Gridley Chucking, four spindle

DRILLS

Allen Sensitive, five spindle
Avey Sensitive, four spindle
20" Barnes Camelback, single spindle
24" Cincinnati Sliding Head, single spindle
30" Sibley Sliding Head, single spindle
4' Dresses Radial, s.p.d.

GEAR CUTTERS

No. 5—60" Brown & Sharpe
No. 3—36" Brown & Sharpe
No. 6 Fellows Gear Shaper, m.d.
No. 13 Brown & Sharpe
No. 12 Barber Colman Hobber
96" Gleason Spur & Bevel Gear Planer

GRINDERS

No. 2 Cincinnati Centerless
No. 72A3 Heald Gagematic
No. 70 Heald Internal
No. 60 Heald Cylinder
10 x 24 Norton Cylindrical
10 x 30 Landis Cylindrical
10 x 36 Norton Cylindrical
10 x 50 Norton Cylindrical
20 x 144 Landis Cylindrical
24" Safety Face
No. 2 Wilmarth & Morman Surface
No. 12 Brown & Sharpe Cutter
76" Rogers Knife Grinder

LATHES, ENGINE

17" x 8' Sidney, c.d.
26" x 16' Lodge & Shipley, c.d.
29" x 14' Schumaker, Boye & Emmes, c.d.
13" x 20" Adams Shortcut, q.h.
8" x 60" Fitchburg Lo-Swing, q.h.

LATHES, TURRET

42" Bullard New Era V.T.L.
No. 3A Warner & Swasey, q.h.
26" Libby, q.h.
No. 5A Potter & Johnston, q.h.
No. 4 Millholland, c.d.
No. 2 Brown & Sharpe
No. 1 Warner & Swasey, c.d.
No. 0 Foster

MILLS

No. 3 LeBlond Universal, c.d.
No. 3 Cincinnati Plain, s.p.d.
No. 1½A Rockford Plain, c.d.
No. 2½B Milwaukee Vertical, s.p.d.
No. 2 Standard Hand Mill
4" Pratt & Whitney Spline
No. 5 Becker Vertical, c.d.
42" Bullard Vertical Boring, m.d.

MISCELLANEOUS

American Chip Separator, 2 bu.
6" Williams Pipe Machine
12" Williams Pipe Machine
No. 55 Toledo Press

PLANERS & SHAPERS

32" x 32" x 10' New Haven Planer, 1 head
24" x 24" x 8' American Planer, 1 head
16" Cincinnati Shaper, c.d.

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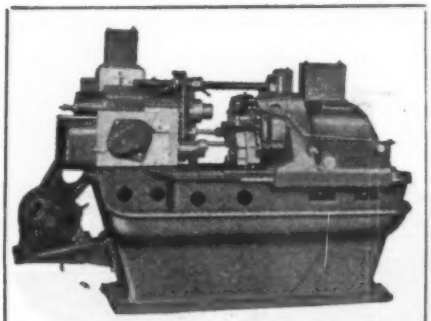

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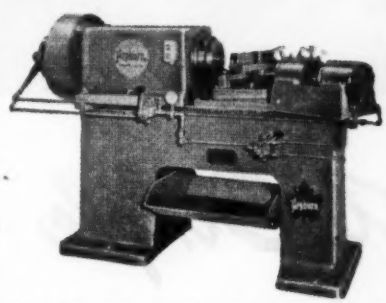

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